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Haystack Pointing System: Printer Package

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Editors

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

LINCOLN LABORATORY

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ABSTRACT

The Printer Package is a set of general-purpose routines for: converting internally-stored numbers either in floating point, fixed point, integer, or octal form or alphanumeric strings to an output form suitable for printing; controlling format; and printing the output form. A user program by means of simple calling sequences can print virtually any information it has in a suitable form. The Printer Package and the user program are compiled together.

Accepted for the Air Force
Stanley J. Wisniewski
Lt Colonel, USAF
Chief, Lincoln Laboratory Office

PREFACE

This document was written by C. W. Adams Associates, 575 Technology Square, Cambridge, Massachusetts, under subcontract to Group 62 of Lincoln Laboratory, as part of a programming effort on the Haystack Pointing System.

CONTENTS

I. INTRODUCTION

The Printer Package (PPKG) is a set of general-purpose routines for 1) converting internally-stored numbers or alphanumeric strings to output form suitable for printing, 2) controlling the format, and 3) performing the actual printing. Many of the routines resemble functions available in SOS OUTRAN but are oriented, of course, to the requirements of the Univac 490 and its on-line high-speed printer.

Available in the package are routines to convert to output form the following types of information: decimal integers, octal numbers, fixed-point numbers, floating-point numbers, and Fieldata strings. Also available are routines to blank out areas of the print line, to set the column counter to a desired column, to increment the column counter by any number, to establish the top and bottom margins of a printed page, to define a user-prepared print area and, most important, to print the line after skipping a number of lines or ejecting to the top of the next page.

Each routine has an entry point labeled with its own name and assumes a particular calling sequence to provide it with the information it needs from the user. No storage areas are used outside of the Printer Package for communication between routines or between the user and the package. All routines save and restore all registers.

Printing is performed on a double-buffer interrupt system to minimize time wasted in waiting for completion of the actual print operation. The routines prepare an unpacked (one character per word) array corresponding to a print line; then, just prior to printing, this is compressed to a packed buffer as the printer expects it.

II. Program Specifications

General Programming Scheme

The PPKG routines are designed with the general philosophy of treating a single unit record at a time, where the unit record in this case consists of a printed line. There are two stages which the programmer must specify for the production of every unit output record.

1) Internal Processing Stage

The internal binary information to be represented by the external printed line is processed, piece by piece, to form a continuous string of characters, one per computer word, occupying a 128 word buffer within PPKG. "Processed" here means either converted to octal, decimal, fixed-point or floating-point Fieldata form or else, simply moved without conversion if already in Fieldata form.

2) Write-out Stage

The information in the internal unpacked buffer is packed into one of the two print buffers and sent out in buffered mode to the line printer.

Calling Sequence Conventions

All routines within the package are called by the RJP instruction followed by one or more words of parameter information, followed by an error return and, finally, the normal return. For the routines which convert internal binary quantities to one of the various output forms (integer, octal, fixed point, floating point) the first parameter word contains an address, and an index register designator. The actual quantity to be converted is taken from the given address plus the contents of the indicated index register when the conversion routine is called. The lower half of the second parameter word contains the column number in which the first character of the converted output is to appear. Other portions of the parameter words give the number of characters, separated into integer and fractional portions where appropriate, to be printed.

Each subroutine description should be consulted for the specific calling sequence for that routine.

Page Formatting

Margins at the top and bottom of the page are established or

changed by the PFORM subroutine. Page ejection or line spacing is controlled by the PSCRIB routine which also prints the accumulated line.

Formatting within an individual line is controlled by the conversion routines' parameter words designating the starting column and the number of characters to be printed. The routine PCOLR may also be used to set the column counter to any desired position and the routine PCOLIN may be used to increment the column counter by a given amount.

The storage register PCOLUMN contains the current value of the column counter which may be a number from 1 to 128. This register is maintained by all routines that store characters into the print line buffer and is cleared by the routine that prints the line.

User-prepared Line Image

If the user has prepared a line image which he wishes to print as is or which he wishes to overlay with other data, he may use the routine PIMAGE to transfer his image area to the buffer area supplied by PPKG. His image area must contain unpacked Fieldata characters, right-justified, and should consist of 128 words. It should be noted that the user's image area is never modified by PPKG, as is the case with OUTRAN. All PPKG routines which place characters in the unpacked print buffer deal only with the buffer internal to PPKG. The user may obtain information about the internal buffers through use of the external communication registers described below.

External Communication

Within PPKG, two registers contain information that may be of value to the user program concerning the location of the current print line data. UNPACKBUFF has in its lower half the address of the unpacked information; PACKBUFF has in its lower half the address of the currently available buffer (that is, the buffer into which the unpacked information will be packed) and in its upper half the address of the packed buffer currently being printed. Each of the buffers indicated is preceded by a single free word which may be used at the discretion of the user. A possible use of this free word is for a carriage control character used on a tape prepared for off-line printing on the 1401.

Other registers which may be of value to the user are:

PCOLUMN - the current value of the column counter
LINCNT - the current line number being printed

Initialization

The PFORM routine, which establishes the top and bottom margins of the page, must be entered before the PSCRIB routine which prints the accumulated line. While not necessary if the package is loaded and executed directly from assembly, this is recommended as a safer practice. It insures that LINCNT, the line counter, will be set to TOPLINE, the first line of printing on the page; that PCOLUMN will be set to column 1; and that STATUS, the register set by the external interrupt routine, will be initialized so that PSCRIB may immediately print its first line. If PFORM is not performed initially, the top margin will have six blank lines and the bottom margin five blank lines. The page is assumed to be 66 lines long.

Routine Names

The routines available to the user are identified below and described in detail in Section III:

Name	Function
PINT	Converts internal quantity to decimal integer format
POCT	Converts internal quantity to octal format
PFIX	Converts internal quantity to fixed-point format
PFLOAT	Converts internal quantity to floating-point format
PFD	Moves Fieldata character string to print line buffer
PBLANK	Moves blanks to print line buffer
PCOLR	Resets column counter to given value
PCOLIN	Increments column counter by given amount
PIMAGE	Moves user-generated print image to internal PPKG buffer
PFORM	Establishes top and bottom margins of page
PSCRIB	Prints line after spacing or ejecting

Routines used strictly internally in the Printer Package are identified below and further described in Section III:

Name	Function
PSCRINT	External interrupt routine
PENTRY	Interprets calling sequence and resets column counter
PLAYUP	Unpacks and counts non-zero characters
PFRACSTOR	Stores fraction in print line buffer
PSAVE	Saves all registers
PRESTORE	Restores all registers
PERRORR	Prints an error message
BINDECINT	Converts binary to decimal integer Fieldata code
BINOCTFLD	Converts binary to octal Fieldata code
BINDECFRA	Converts binary to decimal fraction Fieldata code
SUPZRO	Suppresses leading zeros
COFRND	Rounds off a number to BETA decimal places
COFFIX	Converts binary to fixed-point Fieldata code
COTFLT	Converts two-word floating-point to exponential output form

III. SUBROUTINE DESCRIPTIONS

PINT

Function

To convert the internal binary value indicated by the calling sequence to a decimal integer and store it in the proper column positions of a high-speed printer buffer.

Calling Sequence

```
RJP     PINT
U-TAG   INDEX,ADDRESS
U-TAG   NUMCHAR, COLUMN
Error return
Normal return
```

Input

The value given in ADDRESS + (INDEX).

Output

NUMCHAR + 1 output characters starting in PBUF + COLUMN.

Subroutines Used

PENTRY, BINDECINT, SUPZRO, PLAYUP, PBLANK, PRESTORE, PERRORR.

Storage Areas Read

PCOLUMN, CHARNO, SIGN, LAYUPSTOR.

Storage Areas Written

IOINTEGER, SIGN, LAYUPSTOR (by subroutines), INTEGER, PBUF, PCOLUMN.

Method

The PENTRY routine interprets the calling sequence and sets the column counter to the desired column. The value given is then converted to output form, zero suppressed and unpacked into a one-character-per-word array. The appropriate number of blanks is determined by NUMCHAR minus the number of significant digits minus one for the sign position, and that number of blanks is stored in the buffer. Then the sign (minus or blank) is stored, followed by the integer itself.

Error Conditions

Type 1 - the maximum number of characters in the buffer is exceeded.

Type 2 - the number of significant digits to be printed exceeds NUMCHAR.

POCT

Function

To convert the internal binary value indicated by the calling sequence to an octal number and store it in the proper column positions of a high-speed printer buffer.

Calling Sequence

```
RJP     POCT
U-TAG   INDEX,ADDRESS
U-TAG   NUMCHAR,COLUMN
Error return
Normal return
```

Input

The value given in ADDRESS + (INDEX).

Output

NUMCHAR + 1 output characters starting in PBUF + COLUMN.

Subroutines Used

PENTRY, BINOCTFLD, PLAYUP, PRESTORE, PERRORR.

Storage Areas Read

PCOLUMN, LAYUPSTOR.

Storage Areas Written

IOINTEGER, LAYUPSTORE (by subroutines), PCOLUMN, PBUF.

Method

The PENTRY routine interprets the calling sequence and sets the column counter to the desired column. The value given is then converted to output form and unpacked into a one-digit-per word array. The lower NUMCHAR digits are then stored in the output buffer (if NUMCHAR = 0, it is taken as 10).

Error Conditions

Type 1 - The maximum number of characters in the buffer is exceeded.

PFIX

Function

To convert the internal binary value indicated by the calling sequence to a fixed-point number and store it in the proper column positions of a high-speed printer buffer.

Calling Sequence

```
RJP     PFIX
U-TAG   INDEX,ADDRESS
U-TAG   BINARY-PT,COLUMN
U-TAG   NUMCHARINT,NUMCHARFRAC
Error return
Normal return
```

Input

The value given in ADDRESS + (INDEX).

Output

NUMCHARINT + 1, decimal pt., NUMCHARFRAC output characters starting in PBUF + COLUMN.

Subroutines Used

PENTRY, COFFIX, PLAYUP, PBLANK, PFRACSTOR, PRESTORE, PERRORR.

Storage Areas Read

SIGN, LAYUPSTOR, PCOLUMN, CHARNO.

Storage Areas Written

IOINTEGER, LAYUPSTOR (by subroutines), PBUF, PCOLUMN.

Method

The PENTRY routine interprets the calling sequence and sets the column counter to the desired column. The value is converted from a fixed-point number with the indicated binary point and unpacked into a one-digit-per-word array. The appropriate number of blanks is determined by NUMCHARINT minus the number of significant digits in the integer portion of the number, and that number of blanks is stored in the buffer. The sign (minus or blank) is then stored, followed by the integer portion, then a decimal point, and finally the fractional portion.

Error Conditions

Type 1 - the maximum number of characters in the buffer is exceeded.

Type 2 - the number of significant integer digits exceeds NUMCHARINT.

PFLOAT

Function

To convert the internal floating-point number indicated by the calling sequence to an exponential output form and store it in the proper column positions of a high-speed printer.

Calling Sequence

```
RJP     PFLOAT
U-TAG   INDEX,ADDRESS
U-TAG   NUMCHARFRAC,COLUMN
Error return
Normal return
```

Input

The value given in ADDRESS + (INDEX).

Output

A string of output characters consisting of a sign, an integer, a decimal point, NUMCHARFRAC decimal digits, a sign for the exponent, and two digits for the exponent beginning at PBUF + COLUMN.

Subroutines Used

PENTRY, COTFLT, PFRACSTOR, PRESTORE, PERRORR.

Storage Areas Read

SIGN, IOEXPONENT.

Storage Areas Written

SIGN, EXPSIGN, IOINTEGER, IOFRACTION, IOEXPONENT (by subroutines), BETA, PBUF, PCOLUMN.

Method

The PENTRY routine interprets the calling sequence and sets the column counter to the desired column. The value is converted from floating-point form to output form and stored one character at a time into the buffer. If the exponent is zero, blanks are stored in place of the sign and two exponent digits.

Error Conditions

Type 1 - the maximum number of characters in the buffer is exceeded.

Type 4 - the floating-point number has an erroneous format.

Function

To store internal Fieldata code into the proper column positions of a high-speed printer buffer.

Calling Sequence

```
RJP     PFD
U-TAG   INDEX,ADDRESS
U-TAG   NUMCHAR,COLUMN
Error return
Normal return
```

Input

The packed string of characters starting at ADDRESS + (INDEX).

Output

An unpacked string of output characters starting in PBUF + COLUMN.

Subroutines Used

PENTRY, PRESTORE.

Storage Areas Read

None.

Storage Areas Written

PBUF, PCOLUMN.

Method

The PENTRY routine interprets the calling sequence and sets the column counter to the desired column. Then the Fieldata words are unpacked into one character per word and stored in the buffer until NUMCHAR of them have been stored.

Error Conditions

Type 1 - the maximum number of characters in the buffer is exceeded.

PBLANK

Function

To store blanks in the proper column positions of the high-speed printer buffer.

Calling Sequence

```
RJP     PBLANK
U-TAG   COLUMN,NUMCOLS
Error return
Normal return
```

Input

The desired starting column and number of columns to be blanked given in the calling sequence.

Output

Blanks stored in PBUF + COLUMN through PBUF + COLUMN + NUMCOLS.

Subroutines Used

PCOLR, PERRORR.

Storage Areas Read

PCOLUMN.

Storage Areas Written

PCOLUMN, PBUF.

Method

If NUMCOLS = 0, 128-PCOLUMN is substituted so that the rest of the line is blanked out. If COLUMN = 0, the current column counter is used as the desired starting column. If COLUMN ≠ 0, the PCOLR subroutine is used to reset the column counter to that value.

Error Conditions

Type 1 - the maximum number of column positions in the buffer is exceeded.

PCOLR

Function

To reset the column counter to a given value.

Calling Sequence

```
RJP     PCOLR
U-TAG   INDEX,COLUMN
Error return
Normal return
```

Input

The value given in COLUMN + (INDEX).

Output

PCOLUMN.

Subroutines Used

PERRORR.

Storage Areas Read

None.

Storage Areas Written

PCOLUMN.

Method

The value COLUMN + (INDEX) is tested for not exceeding 128 and, if not, stored in PCOLUMN.

Error Conditions

Type 1 - the maximum number of columns has been exceeded. PCOLUMN is set to 0.

PCOLIN

Function

To increment the column counter and test for exceeding the maximum number of positions.

Calling Sequence

```
RJP     PCOLIN
U-TAG   INDEX,NUMCOLS
Error return
Normal return
```

Input

The value given in NUMCOLS + (INDEX).

Output

PCOLUMN.

Subroutines Used

PERRORR.

Storage Areas Read

None.

Storage Areas Written

PCOLUMN.

Method

Add NUMCOLS + (INDEX) to PCOLUMN and test for not exceeding 128.

Error Conditions

Type 1 - the maximum number of columns has been exceeded.

PIMAGE

Function

To move the contents of an output buffer area containing unpacked Fieldata characters to PBUF, the buffer area supplied by PPKG.

Calling Sequence

```
RJP     PIMAGE
U-TAG   INDEX,ADDRESS
Error return
Normal return
```

Input

The 128-word area beginning at ADDRESS + (INDEX).

Output

The 128-word area beginning at PBUF + 1.

Subroutines Used

None.

Storage Areas Read

None.

Storage Areas Written

PBUF.

Method

The entire 128-word array is transferred from the users area to PBUF.

Error Conditions

None.

PFORM

Function

To establish the top and bottom margin areas of the printer page and advance the paper to the top of the next page. Also serves to initialize printer functions, interrupt routines, etc.

Calling Sequence

```
RJP     PFORM
U-TAG   LINESTOP,LINESBOTTOM
Error return
Normal return
```

Input

Margin information in the calling sequence, i.e., number of blank lines desired at top and bottom of page.

Output

TOPLINE, BOTLINE, LINCNT, BOTMARG.

Subroutines Used

None.

Storage Areas Read

STATUS.

Storage Areas Written

TOPLINE, BOTLINE, LINCNT, BOTMARG, STATUS.

Method

TOPLINE = LINESTOP + 1
BOTMARG = LINESBOTTOM
BOTLINE = PAGESIZE (66) - BOTMARG
LINCNT (after advancing to top of next page) = TOPLINE
PAGESIZE is an assembly parameter which is set to 66_{10} for normal printer paper.

Error Conditions

If STATUS > 1, a printer error is indicated and the computer is stopped. Pushing the HI-SPEED button on the console will cause the routine to reissue the offending print instruction. This will continue until the printer error condition is remedied, at which time the print instruction will be properly executed and the routine will return via the normal exit.

PSCRIB

Function

To print one line from the buffer after spacing or advancing to the top of the next page.

Calling Sequence

```
RJP    PSCRIB
U-TAG  PAGETOP, LINESKIP
Error return
Normal return
```

Input

PBUF, the information in the calling sequence.

Output

The printed line on the proper line number.

Subroutines Used

PSAVE, PSCRIBSS (internal to PSCRIB), PRESTORE, PSCRINT (external interrupt routine)

Storage Areas Read

BOTLINE, LINCNT, BOTMARG, TOPLINE, PBUF, STATUS, PSCRIBD.

Storage Areas Written

LINCNT, PSCRIBD, PREGION, PCOLUMN

Method

If PAGETOP $\neq$ 0, an ejection to the top of the next page before printing is indicated. The value of BOTLINE - LINECNT - BOTMARG + TOPLINE is computed and tested to see if it exceeds 63_{10}, the maximum number of lines the printer is able to skip.

If so, the command to skip 63 lines without printing is given, after which 63 is subtracted from the previously computed value placed in the lines-to-skip portion of the print command word. The value of TOPLINE is stored in LINCNT since, after advancing and printing, the paper will be at the top line of printing on the next page.

If page topping is not desired, the value of BOTLINE - LINCNT is tested against the number of lines desired to skip given in the calling sequence. If the number of lines exceeds this value, page topping is automatically indicated and BOTMARG + TOPLINE must be added to must be added to space the paper past the inter-page margins. Otherwise the number of lines to skip is inserted directly into the print command word and LINCNT incremented by this amount.

The actual printing process is a double-buffered operation. The available packed buffer area which will begin at either PREGION or PREGION + 27_{10} is determined by looking in the buffer control word PSCRIBD. The information from PBUF is packed five characters to a word and stored in the available buffer. Before the print command is issued, the register STATUS is tested to see if the external interrupt routine PSCRINT has been entered, signifying that the previous print command was completed. If STATUS = 1, the previous print command was successfully completed, so the new print command and buffer initiation is issued for the information just packed into the available buffer. Now the buffers are switched, STATUS is cleared and registers are restored before exit.

Error Conditions

If STATUS > 1, a printer error is indicated and the computer is stopped. Pushing the HI-SPEED button on the console will cause the routine to reissue the offending print instruction. This will continue until the printer error condition is remedied, at which time the print instruction will be properly executed and the routine will return via the normal exit.

PENTRY

Function

To interpret the calling sequence to the routine which called PENTRY, save all registers and set the column counter to the desired column.

Calling Sequence

```
PANYTHING ENTRY
          RJP  PENTRY
          Error return
          Normal return
```

Input

Calling sequence to calling routine.

Output

PCOLUMN, desired ADDRESS + (INDEX) in B6.

Subroutines Used

PSAVE, PCOLR.

Storage Areas Read

None.

Storage Areas Written

PCOLUMN.

Method

The A, Q, and B1 through B7 registers are saved by PSAVE for later restoration by PRESTORE. The entry point of PENTRY is used to determine the entry point of the calling routine, which in turn is used to obtain the desired address of the value to be converted for output. The lower half of the word following that is used to reset the column counter by use of PCOLR if it is not equal to zero. Just before the routine returns to the normal exit, B6 is loaded with the desired address.

Error Conditions

The error return from PCOLR causes an exit to the error return.

PLAYUP

Function

To unpack and store the Fieldata characters in the words indicated by the calling sequence in the area LAYUPSTOR.

Calling Sequence

```
RJP     PLAYUP
U-TAG   PACKEDAREA,NUMWORDS
Normal return
```

Input

The characters in PACKEDAREA through PACKEDAREA + NUMWORDS-1.

Output

LAYUPSTOR, CHARNO.

Subroutines Used

None.

Storage Areas Read

None.

Storage Areas Written

LAYUPSTOR, CHARNO.

Method

Up to 130 characters may be unpacked from the area designated and stored one character per word in LAYUPSTOR, with the final number of characters stored in CHARNO. Any whole words or individual characters which are blank (zero) will not be stored.

Error Conditions

None.

PFRACSTOR

Function

To store the fractional portion of a number in the high-speed printer buffer.

Calling Sequence

```
RJP  PFRACSTOR
Error return
Normal return
```

Input

BETA, IOFRACTION.

Output

PBUF.

Subroutines Used

PERRORR.

Storage Areas Read

BETA, IOFRACTION.

Storage Areas Written

PBUF, BETA.

Method

If BETA = 0, the routine exits immediately. Otherwise a decimal point is stored in PBUF followed by BETA digits starting from the high-order digits of IOFRACTION.

Error Conditions

Type 1 - The maximum number of characters in the buffer has been exceeded.

PERRORR

Function

To print and type the error type and the location of the error.

Calling Sequence

```
ENT A  W(ERRORWD)
RJP    PERROR
Normal return
```

where ERRORWD has the format: U-TAG ERRORTYPE, LOCATION

Input

Information in calling sequence.

Output

The message "ERROR TYPE n AT LOCATION mmmmm" on both the console printer and the high-speed printer.

Subroutines Used

PIMAGE, PSCRIB, PLAYUP.

Storage Areas Read

None.

Storage Areas Written

LAYUPSTOR.

Method

The error type is converted to a two-digit Fieldata code and stored in the proper place in the error message. The location is likewise converted to output format and stored in the message. Through the use of PIMAGE, this message is put in the high-speed printer buffer and printed by PSCRIB, after which it is unpacked by PLAYUP and printed on the console printer.

Error Conditions

None.

COTFLT

Function

To convert the value indicated by the calling sequence from internal floating-point form to output exponential form.

Calling Sequence

```
RJP    COTFLT
U-TAG  ADDRESS,0
Error return
Normal return
```

Input

Floating-point value in ADDRESS (2).

Output

IOINTEGER + 1, IOFRACTION(2), IOEXPONENT, EXPSIGN, SIGN.

Subroutines Used

FLTPT, BINDECINT, BINDECFRA, COFRND, SUPZRO.

Storage Areas Read

EXPONENT, FPFRACTION.

Storage Areas Written

INTEGER, FRACTION, EXPONENT, FPFRACTION, IOINTEGER(2), IOFRACTION(2), IOEXPONENT, EXPSIGN, SIGN, SINTEMP.

Method

The value indicated by the calling sequence is stored as a positive quantity in the common area EXPONENT and FPFRACTION along with temporary storage of the true sign. Separate paths are entered depending on the sign of the exponent, but as the functions are similar only the positive exponent path will be described.

The number is tested against the floating-point representation of 10^{10} and repeatedly divided by it with corresponding adjustment of IOEXPONENT until it is less. Then it is tested against a table of floating-point representations of powers of ten and divided by the highest one which is less than it, thus making the number in terms of units only. Now the value can be shifted an amount equal to the exponent minus the base (40000) to separate the integer and fractional portions which are each converted separately to output format. The resultant I/O values are rounded to BETA decimal places and zero suppressed. The IOEXPONENT is then converted to decimal for output.

Error Conditions

If the resultant value of IOEXPONENT is greater than 40, the routine exits to the error return.

COFFIX

Function

To convert the fixed-point value indicated by the calling sequence to output fixed point format with BETA decimal places printing.

Calling Sequence

```
RJP     COFFIX
U-TAG   ADDRESS,GAMMA
Normal return
```

Input

Value in address given in calling sequence.

Output

IOINTEGER(2), IOFRACTION(2), SIGN.

Subroutines Used

BINDECINT, BINDECFRA, COFRND, SUPZRO.

Storage Areas Read

Address given in calling sequence.

Storage Areas Written

SIGN, INTEGER, FRACTION, IOINTEGER(2), IOFRACTION(2) (by subroutines).

Method

The value is made positive and its true sign temporarily stored. It is then separated into its integer and fractional portions by the binary point (GAMMA) given in the calling sequence. Each is separately converted to output form and the entire value rounded to BETA decimal places with leading zeros suppressed.

Error Conditions

None.

COFRND

Function

To round off the value in IOINTEGER and IOFRACTION to BETA decimal places.

Calling Sequence

```
RJP  COFRND
Normal return
```

Input

IOINTEGER(2), IOFRACTION(2), BETA.

Output

IOINTEGER(2), IOFRACTION(2).

Subroutines Used

None.

Storage Areas Read

IOINTEGER(2), IOFRACTION(2), BETA.

Storage Areas Written

IOINTEGER(2), IOFRACTION(2).

Method

The BETA + 1st digit is tested for 5 or greater. If not it is cleared and the fraction replaced as is; if so, the next higher order digits are tested for 9's to see if the carry will propagate upwards. This process continues from IOFRACTION through to IOINTEGER until a digit less than 9 is found at which point 1 is added to it and the value cleared up and prepared for output with BETA digits, zero or greater in IOFRACTION.

Error Conditions

None.

SUPZRO

Function

To suppress leading zeros in the area defined by the calling sequence, converting them to blanks but leaving one zero if the entire value is zero.

Calling Sequence

```
RJP     SUPZRO
U-TAG   AREA, No. of words
Normal return
```

Input

Area given by calling sequence.

Output

Same area.

Subroutines Used

None.

Storage Areas Read

Area given by calling sequence.

Storage Areas Written

Same area.

Method

Test leading digits for zero, clearing each until a non-zero digit is found or the area is exhausted. If the latter condition holds, force in a single zero in the least significant digit position of the area.

Error Conditions

None.

BINDECFRA

Funetion

To convert a value in FRACTION from internal binary form to fractional decimal form suitable for output.

Calling Sequenee

```
RJP  BINDECFRA
Normal return
```

Input

FRACTION.

Output

IOFRACTION(2), SIGN.

Subroutines Used

None.

Storage Areas Read

FRACTION.

Storage Areas Written

IOFRACTION (2), SIGN.

Method

Multiply the fraction by 24_8, each time converting the high order 4 bits to output form and accumulating them in IOFRACTION.

Error Conditions

None.

BINDECINT

Function

To convert the value in INTEGER from binary to decimal in Fieldata output form.

Calling Sequence

```
RJP  BINDECINT
Normal return
```

Input

INTEGER.

Output

IOINTEGER(2), SIGN.

Subroutines Used

None.

Storage Areas Read

INTEGER.

Storage Areas Written

IOINTEGER(2), SIGN.

Method

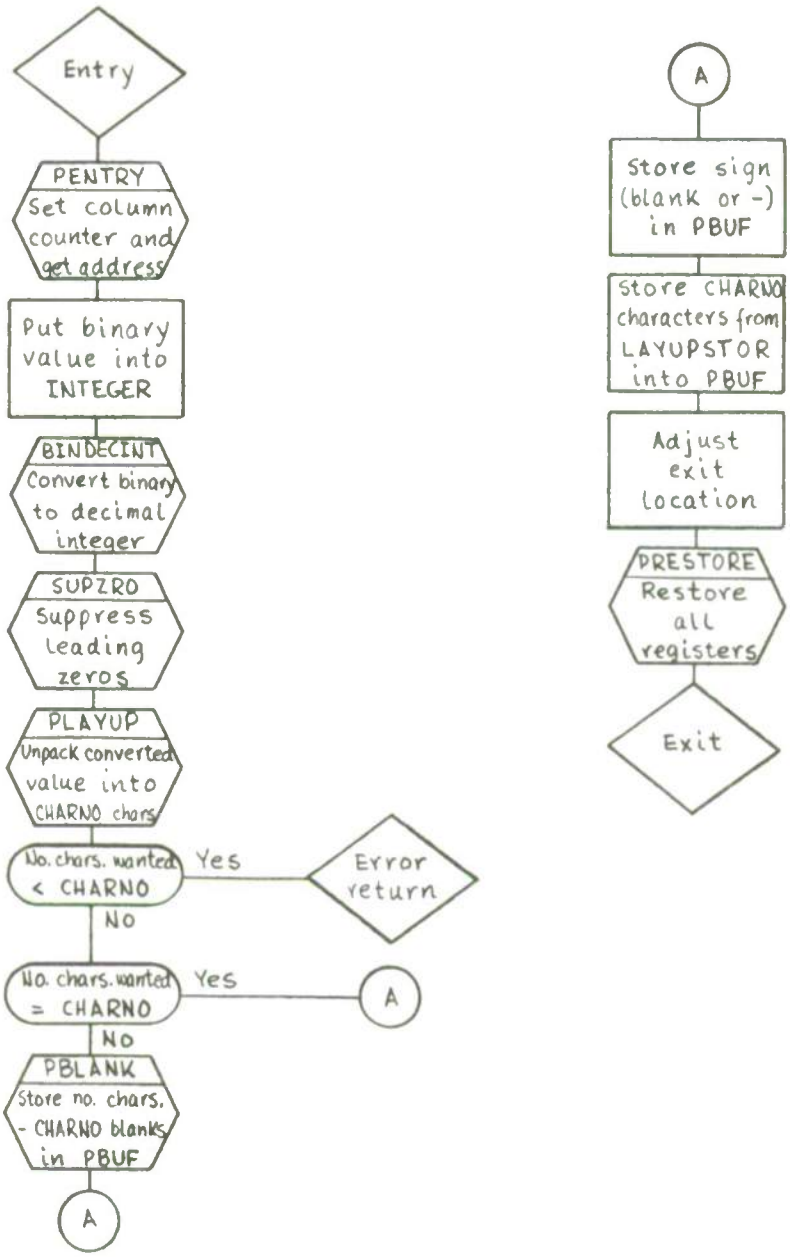
Repeatedly divide the quantity in INTEGER, having been forced positive, by 12_8 and store the remainder in the appropriate digit position of IOINTEGER or IOINTEGER + 1.

Error Conditions

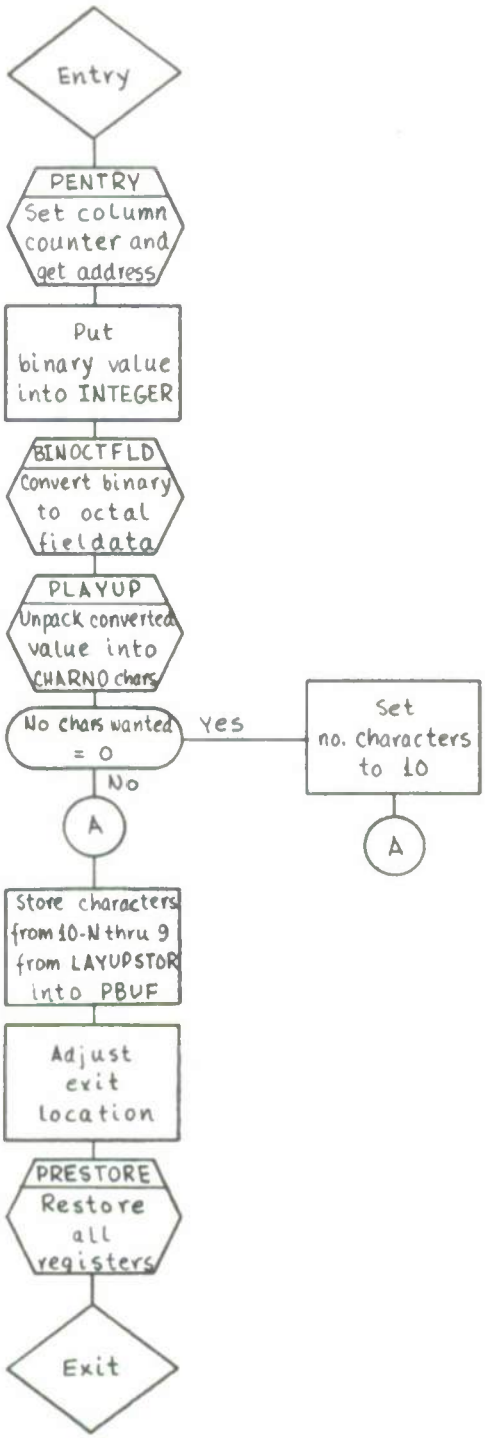
None.

IV. FLOW CHARTS

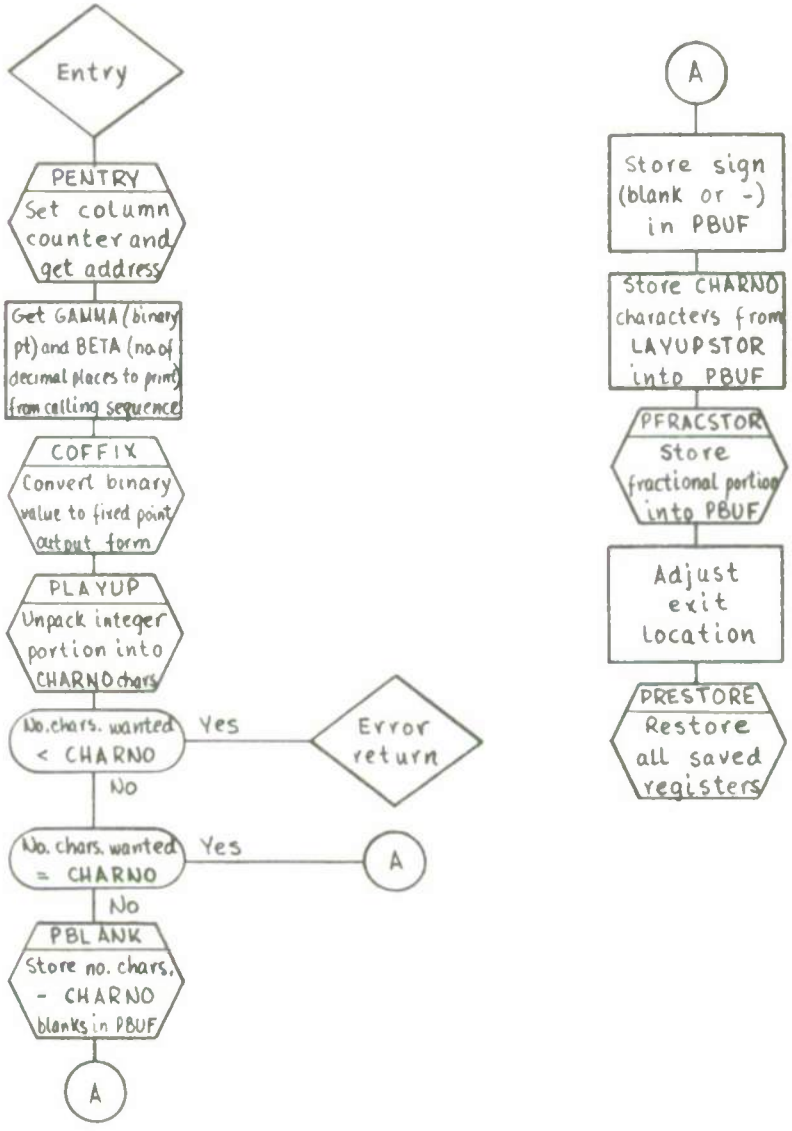
Flow charts for the subroutines described in the preceding section appear on the following pages.


Entry
PENTRY
Set column counter and get address
Put binary value into INTEGER
BINDECINT
Convert binary to decimal integer
SUPZRO
Suppress leading zeros
PLAYUP
Unpack converted value into CHARNO chars
No. chars. wanted < CHARNO
Yes
Error return
NO
No. chars. wanted = CHARNO
Yes
A
NO
PBLANK
Store no. chars. - CHARNO blanks in PBUF
A
A
Store sign (blank or -) in PBUF
Store CHARNO characters from LAYUPSTOR into PBUF
Adjust exit location
PRESTORE
Restore all registers
Exit

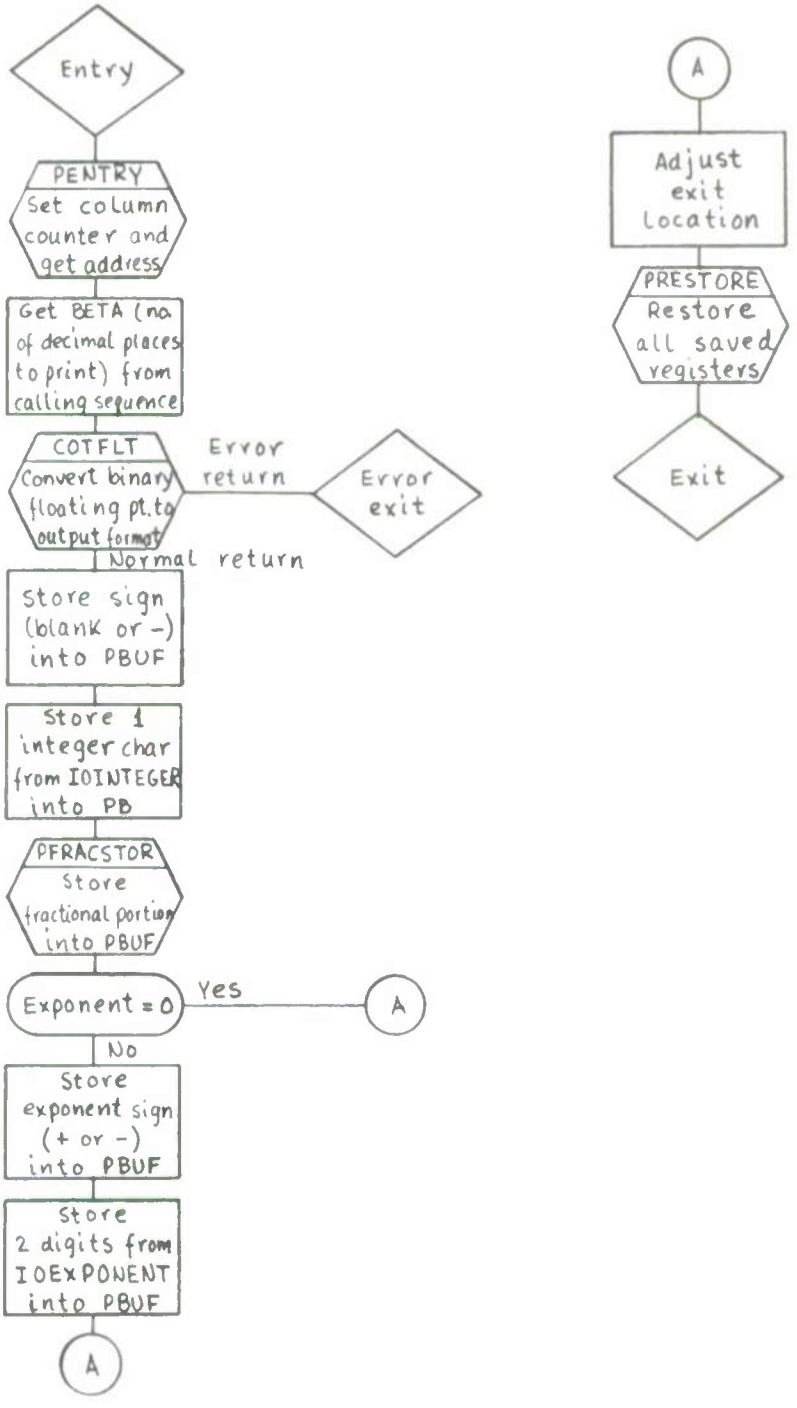
PINT


Entry
PENTRY
Set column counter and get address
Put binary value into INTEGER
BINOCTFLD
Convert binary to octal fieldata
PLAYUP
Unpack converted value into CHARNO chars
No chars wanted = 0
Yes
Set no. characters to 10
A
No
A
Store characters from 10-N thru 9 from LAYUPSTOR into PBUF
Adjust exit location
PRESTORE
Restore all registers
Exit

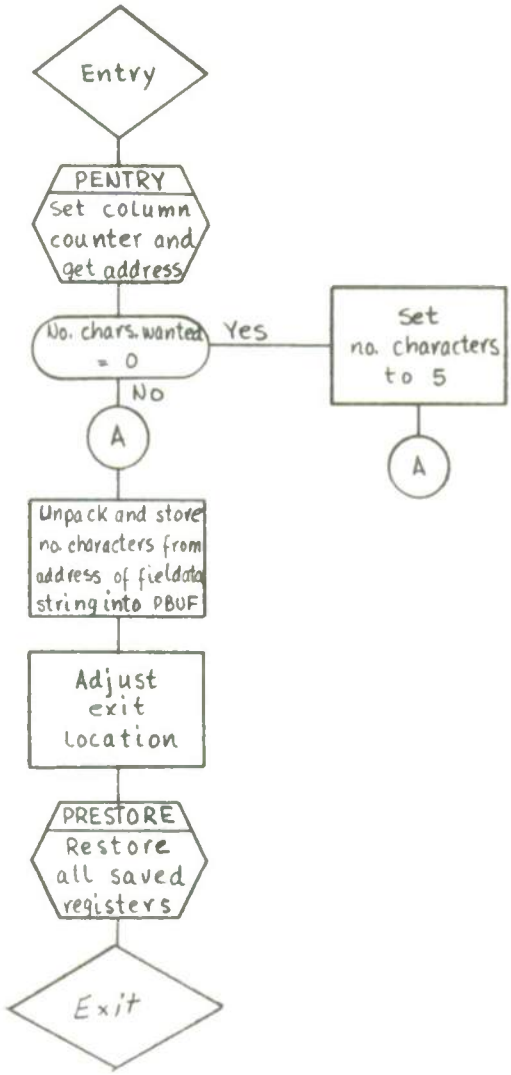
POCT


Entry
PENTRY
Set column counter and get address
Get GAMMA (binary pt) and BETA (no of decimal places to print) from calling sequence
COFFIX
Convert binary value to fixed point output form
PLAYUP
Unpack integer portion into CHARNO chars
No. chars. wanted < CHARNO
Yes
Error return
No
No. chars. wanted = CHARNO
Yes
A
No
PBLANK
Store no. chars, - CHARNO blanks in PBUF
A
A
Store sign (blank or -) in PBUF
Store CHARNO characters from LAYUPSTOR into PBUF
PFRACSTOR
Store fractional portion into PBUF
Adjust exit location
PRESTORE
Restore all saved registers

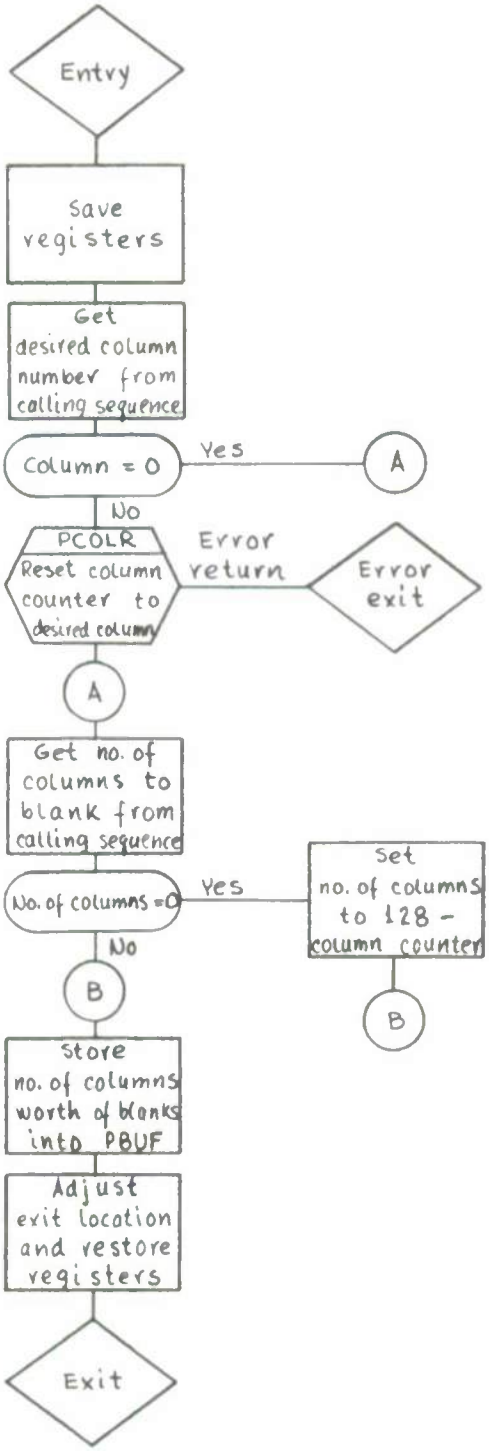
PFIX


Entry
PENTRY
Set column counter and get address
Get BETA (no. of decimal places to print) from calling sequence
COTFLT
Convert binary floating pt. to output format
Error return
Error exit
Normal return
Store sign (blank or -) into PBUF
Store 1 integer char from IOINTEGER into PB
PFRACSTOR
Store fractional portion into PBUF
Exponent = 0
Yes
A
No
Store exponent sign (+ or -) into PBUF
Store 2 digits from IOEXPONENT into PBUF
A
A
Adjust exit Location
PRESTORE
Restore all saved registers
Exit

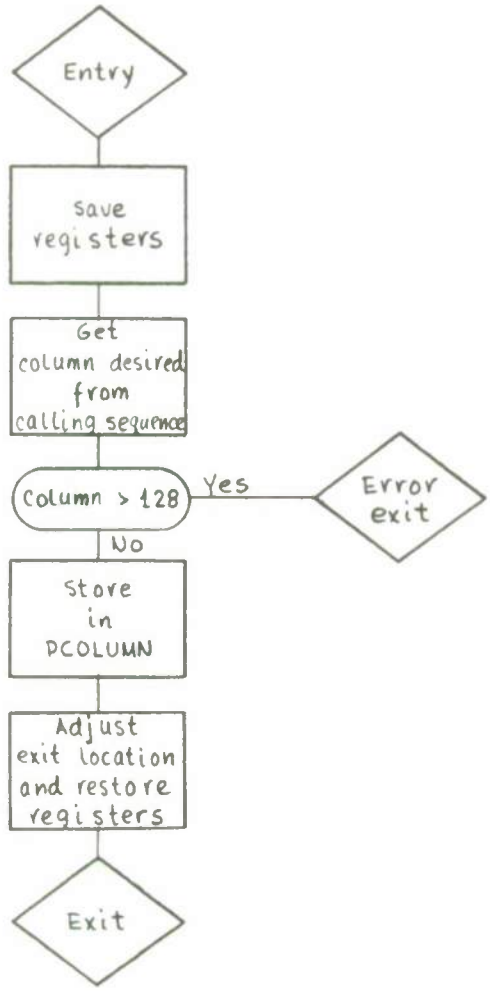
PFLOAT


Entry
PENTRY
Set column counter and get address
No. chars. wanted = 0
Yes
Set no. characters to 5
A
No
A
Unpack and store no. characters from address of fieldata string into PBUF
Adjust exit location
PRESTORE
Restore all saved registers
Exit

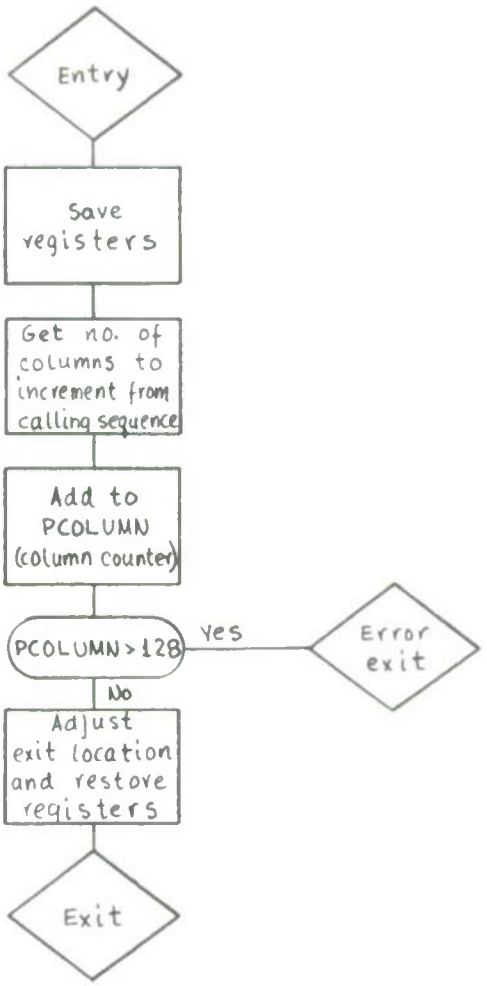
PFD


Entry
Save registers
Get desired column number from calling sequence
Column = 0
Yes
A
No
PCOLR
Reset column counter to desired column
Error return
Error exit
A
Get no. of columns to blank from calling sequence
No. of columns = 0
Yes
Set no. of columns to 128 - column counter
B
No
B
Store no. of columns worth of blanks into PBUF
Adjust exit location and restore registers
Exit

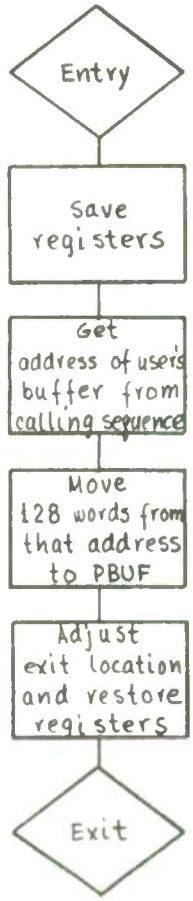
PBLANK


Entry
Save registers
Get column desired from calling sequence
Column > 128
Yes
Error exit
No
Store in PCOLUMN
Adjust exit location and restore registers
Exit

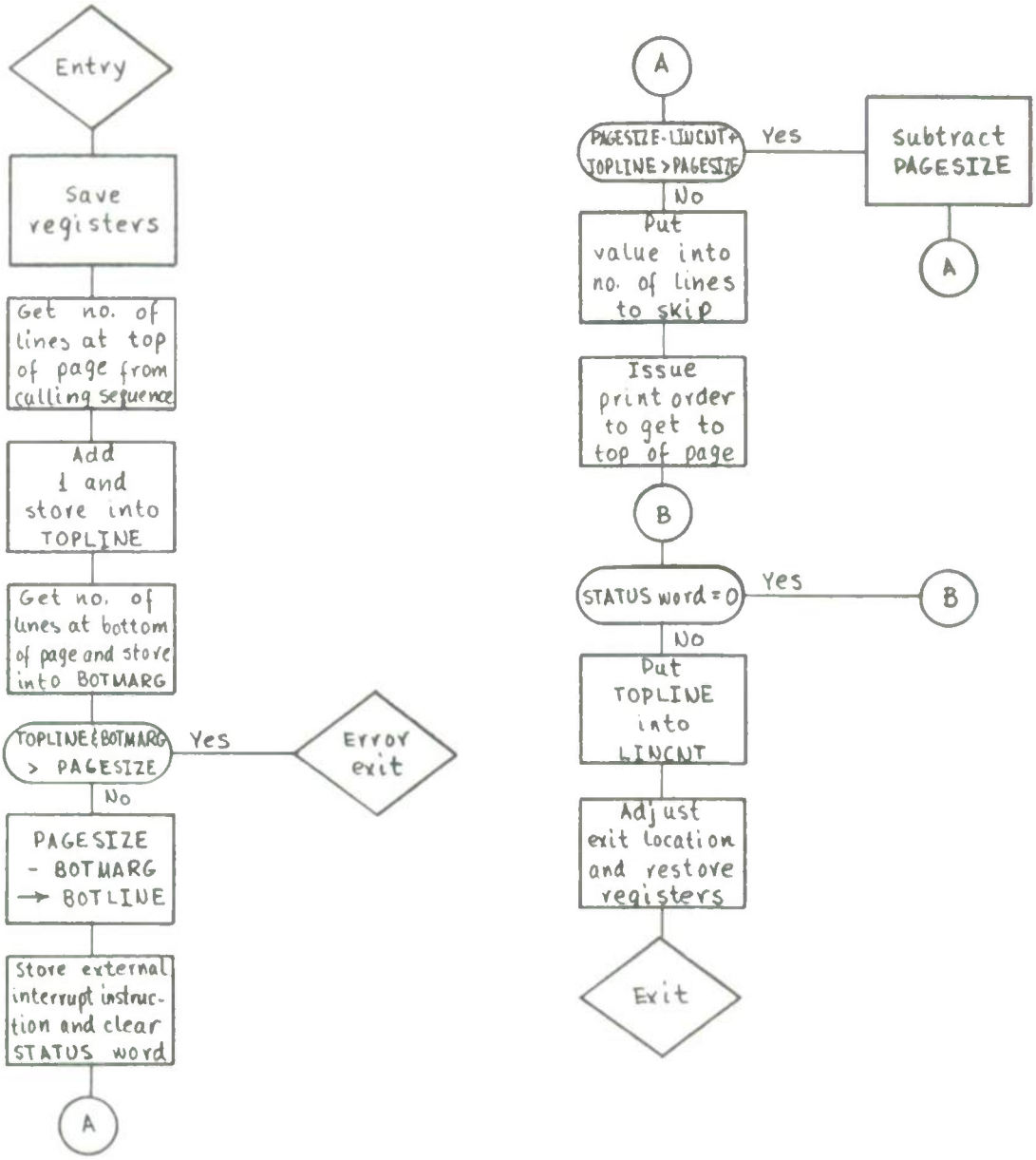
PCOLR


Entry
Save registers
Get no. of columns to increment from calling sequence
Add to PCOLUMN (column counter)
PCOLUMN > 128
yes
Error exit
No
Adjust exit location and restore registers
Exit

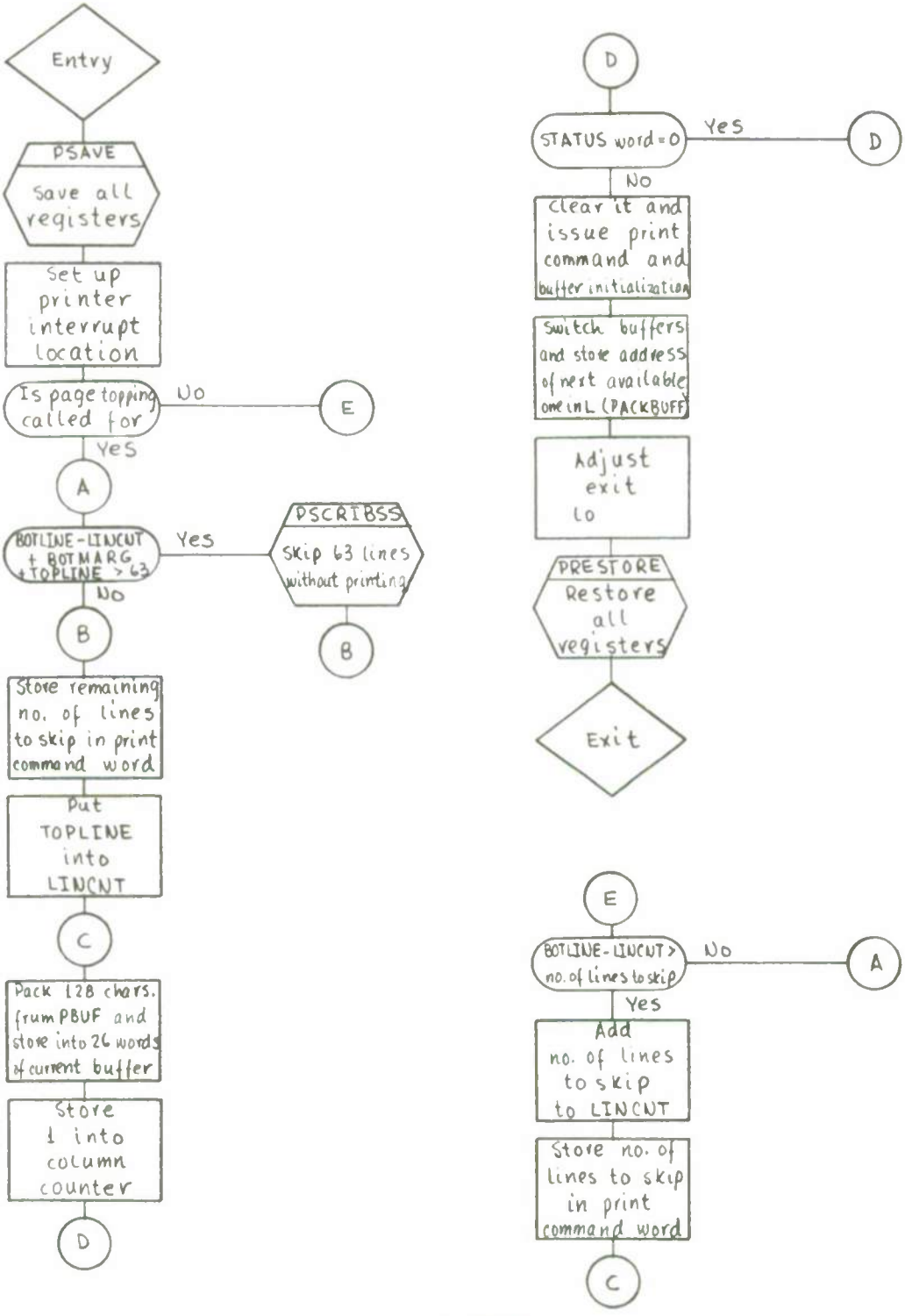
PCOLIN


Entry
Save registers
Get address of user's buffer from calling sequence
Move 128 words from that address to PBUF
Adjust exit location and restore registers
Exit

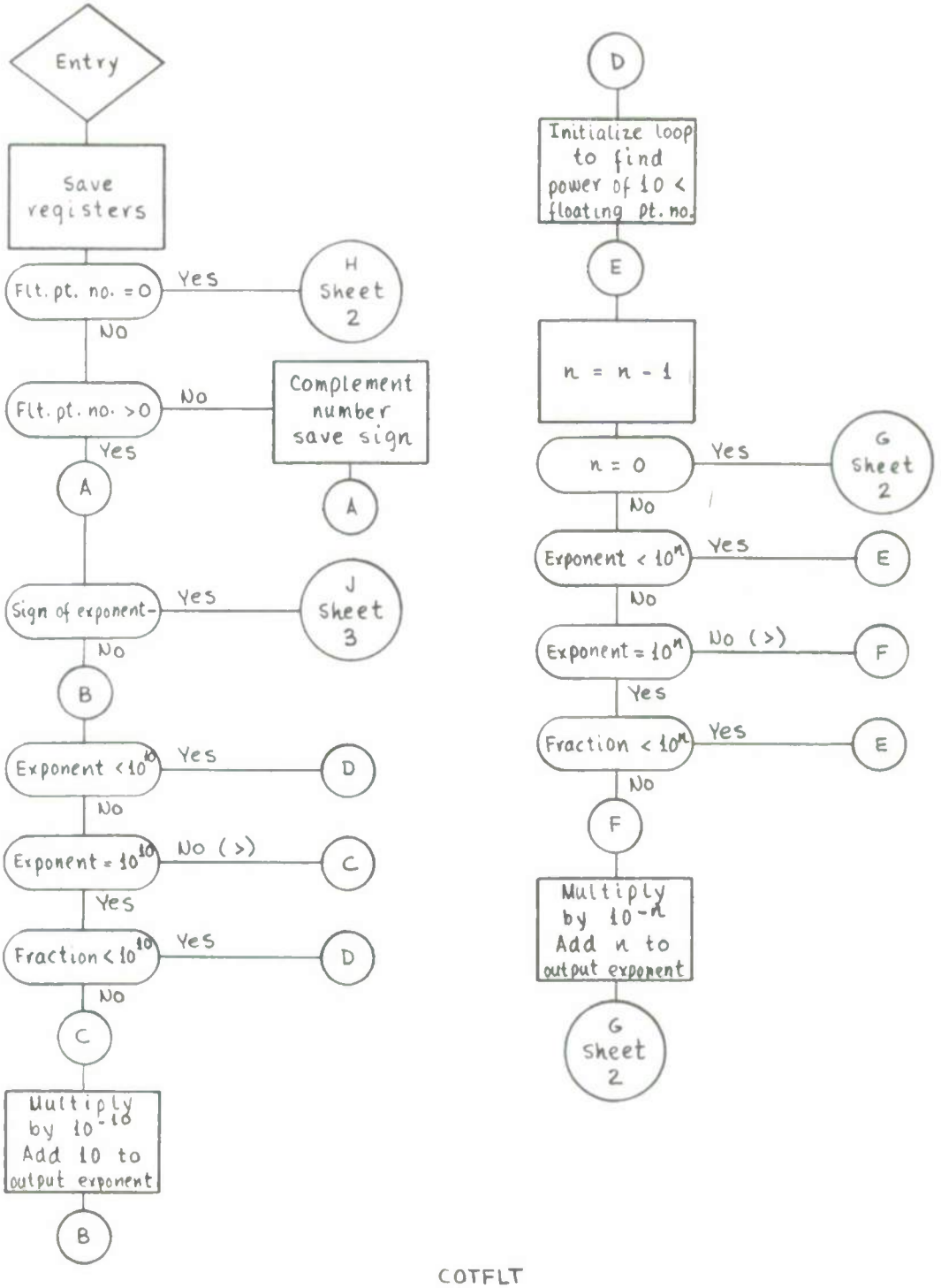
PIMAGE


Entry
Save registers
Get no. of lines at top of page from calling sequence
Add 1 and store into TOPLINE
Get no. of lines at bottom of page and store into BOTMARG
TOPLINE&BOTMARG > PAGESIZE
Yes
Error exit
No
PAGESIZE - BOTMARG → BOTLINE
Store external interrupt instruction and clear STATUS word
A
A
PAGESIZE-LINCNT+ TOPLINE>PAGESIZE
Yes
Subtract PAGESIZE
A
No
Put value into no. of lines to skip
Issue print order to get to top of page
B
STATUS word=0
Yes
B
No
Put TOPLINE into LINCNT
Adjust exit location and restore registers
Exit

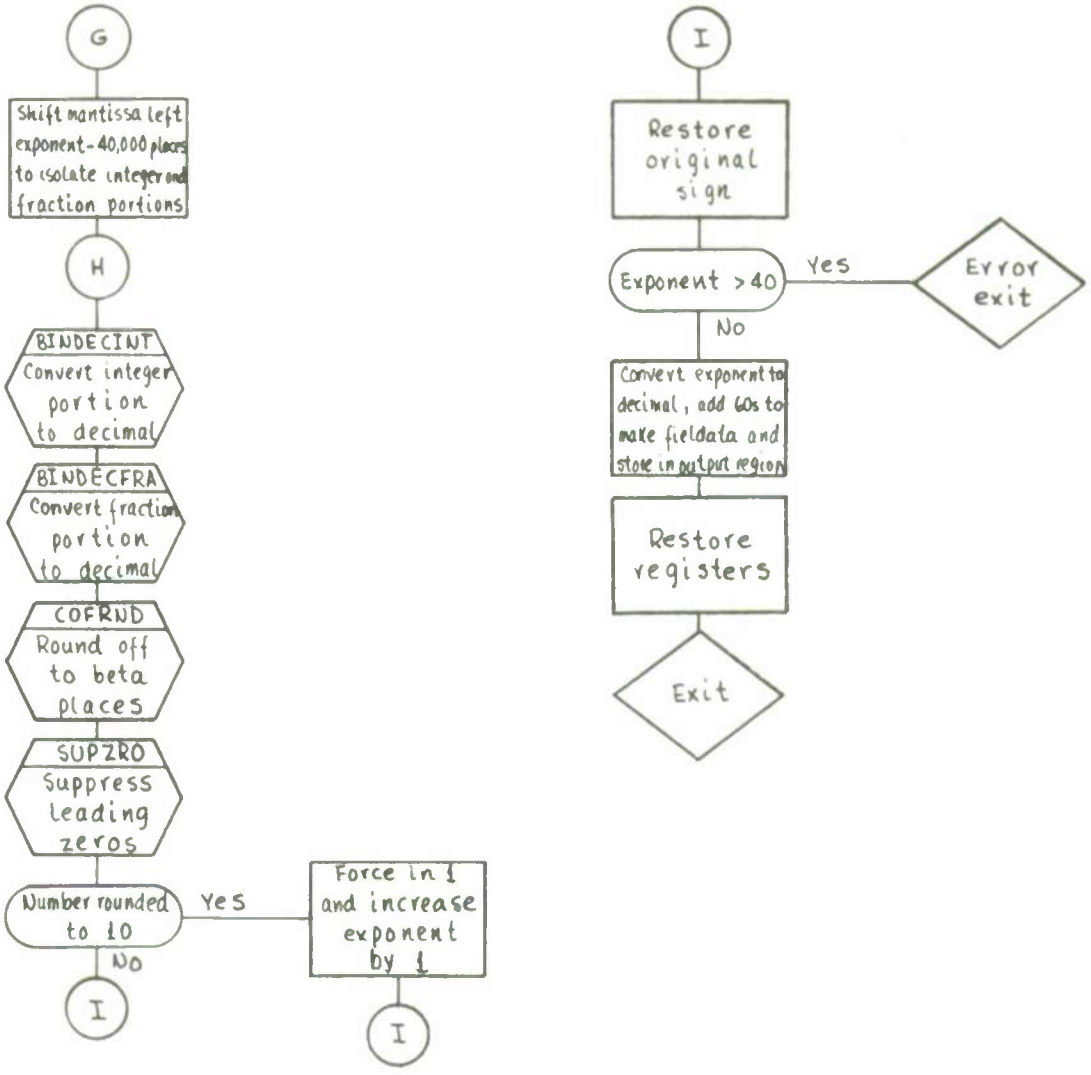
PFORM


Entry
PSAVE
Save all registers
Set up printer interrupt location
Is page topping called for
No
E
Yes
A
BOTLINE-LINCUT + BOTMARG + TOPLINE > 63
Yes
PSCRIBSS
Skip 63 lines without printing
B
No
B
Store remaining no. of lines to skip in print command word
Put TOPLINE into LINCNT
C
Pack 128 chars. from PBUF and store into 26 words of current buffer
Store 1 into column counter
D
D
STATUS word = 0
Yes
D
No
Clear it and issue print command and buffer initialization
Switch buffers and store address of next available one in L (PACKBUFF)
Adjust exit to
PRESTORE
Restore all registers
Exit
E
BOTLINE-LINCUT > no. of lines to skip
No
A
Yes
Add no. of lines to skip to LINCNT
Store no. of lines to skip in print command word
C

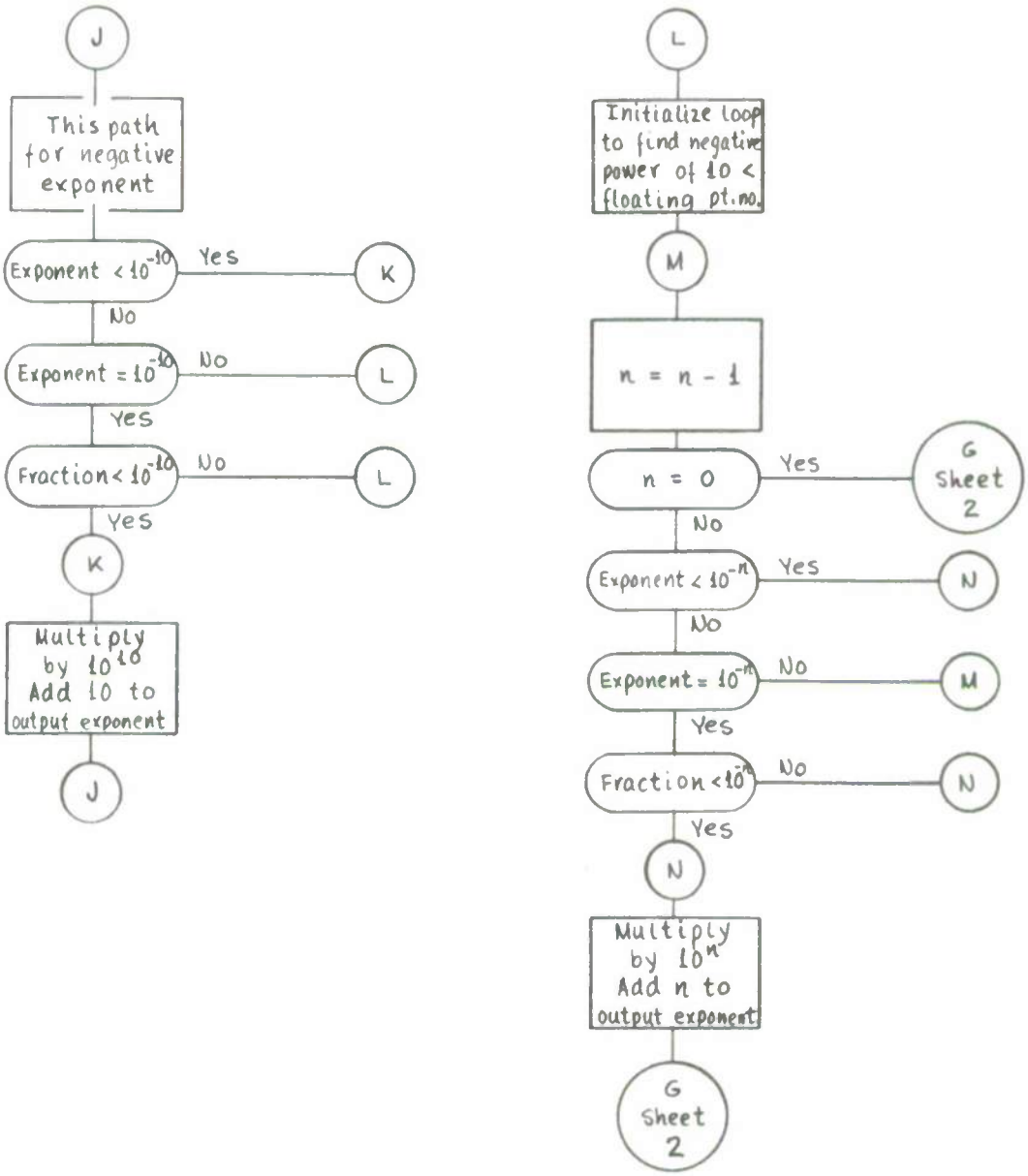
PSCRIB



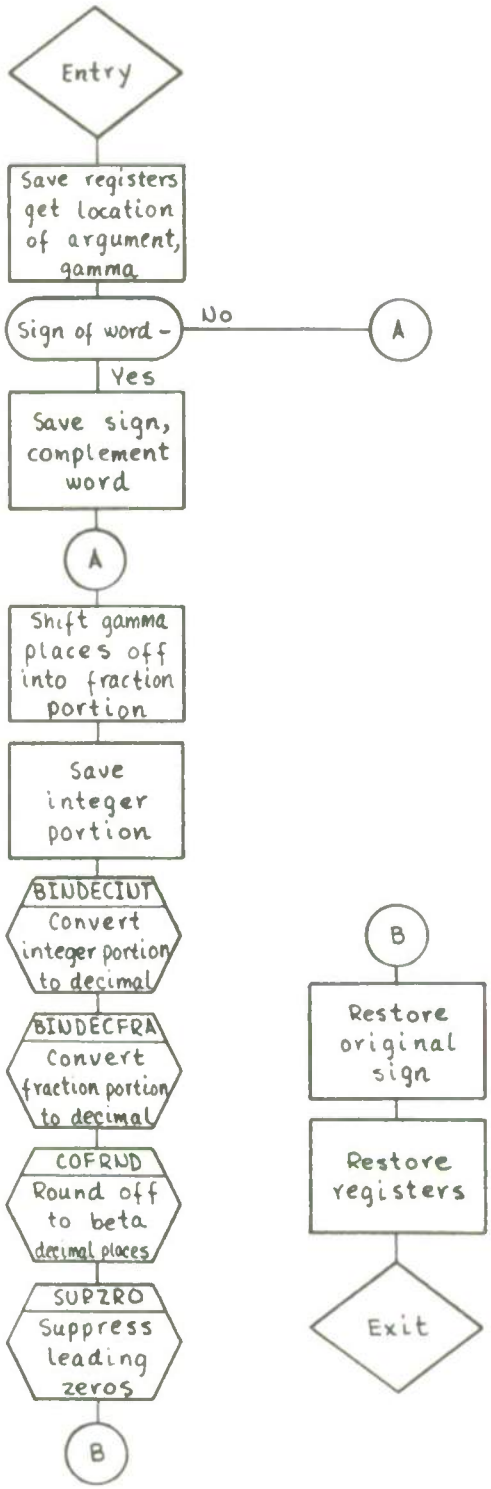
COTFLT
Sheet 1 of 3



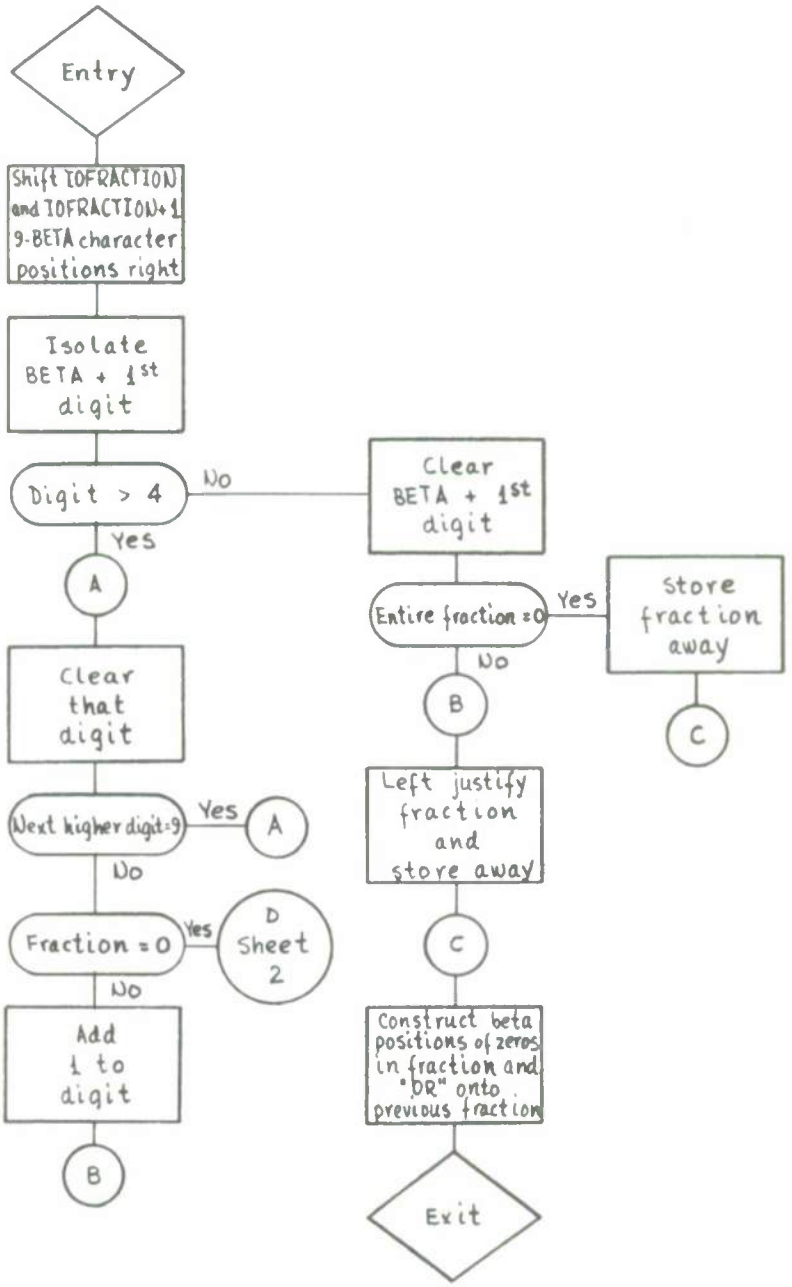
COTFLT
Sheet 2 of 3



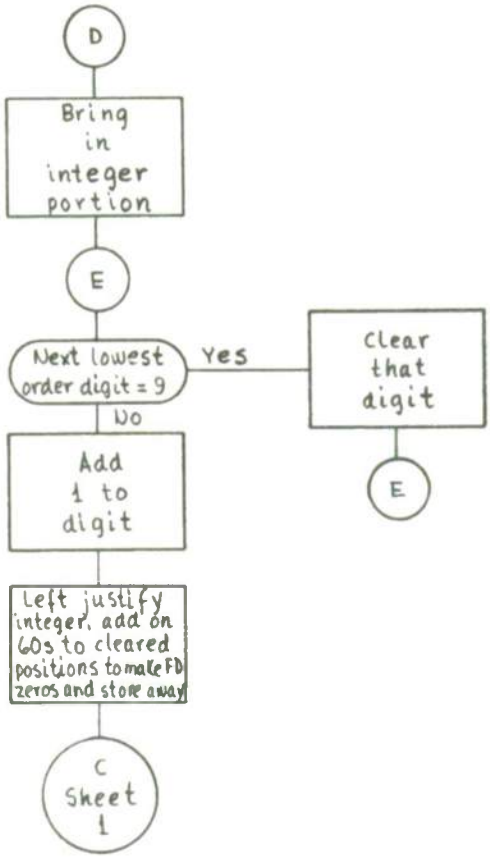
COTFLT
Sheet 3 of 3


Entry
Save registers get location of argument, gamma
Sign of word -
No
A
Yes
Save sign, complement word
A
Shift gamma places off into fraction portion
Save integer portion
BINDECIUT
Convert integer portion to decimal
BINDECFRA
Convert fraction portion to decimal
COFRND
Round off to beta decimal places
SUPZRO
Suppress leading zeros
B
B
Restore original sign
Restore registers
Exit

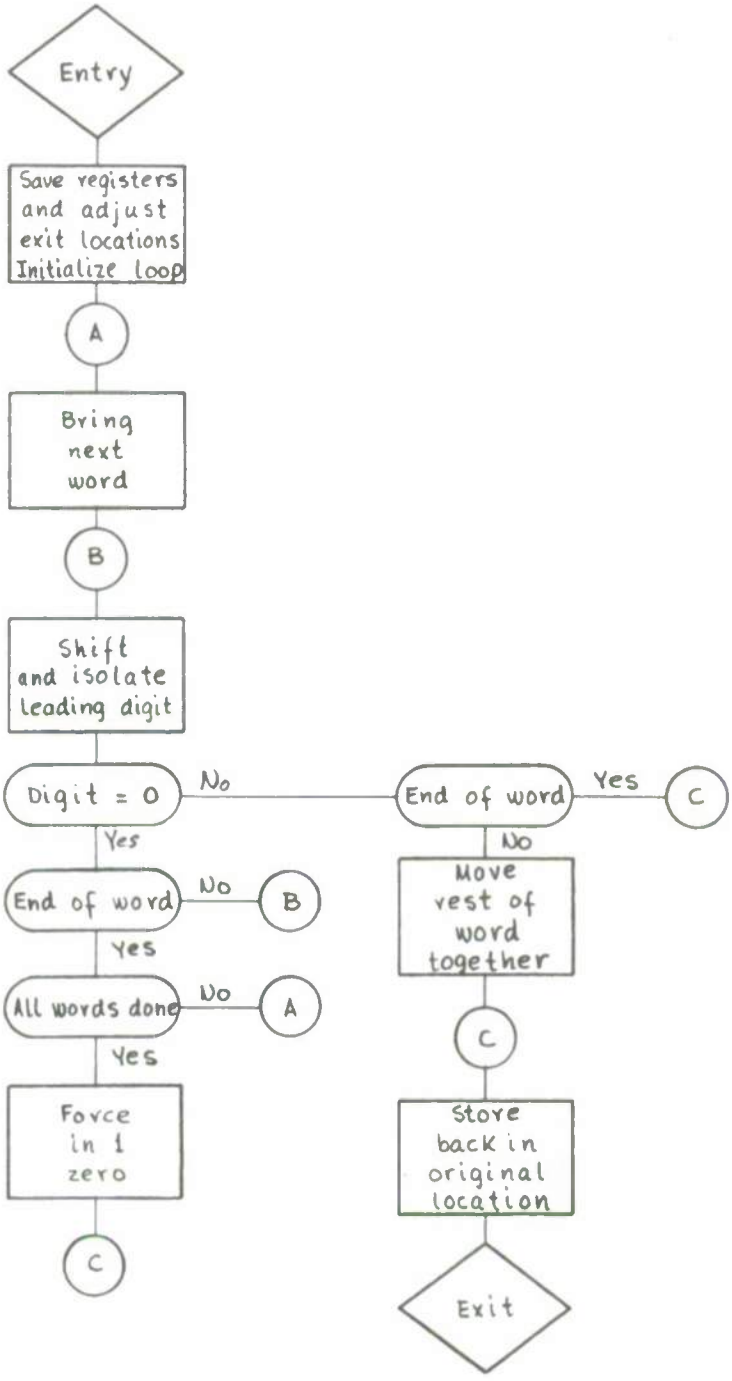
COFFIX



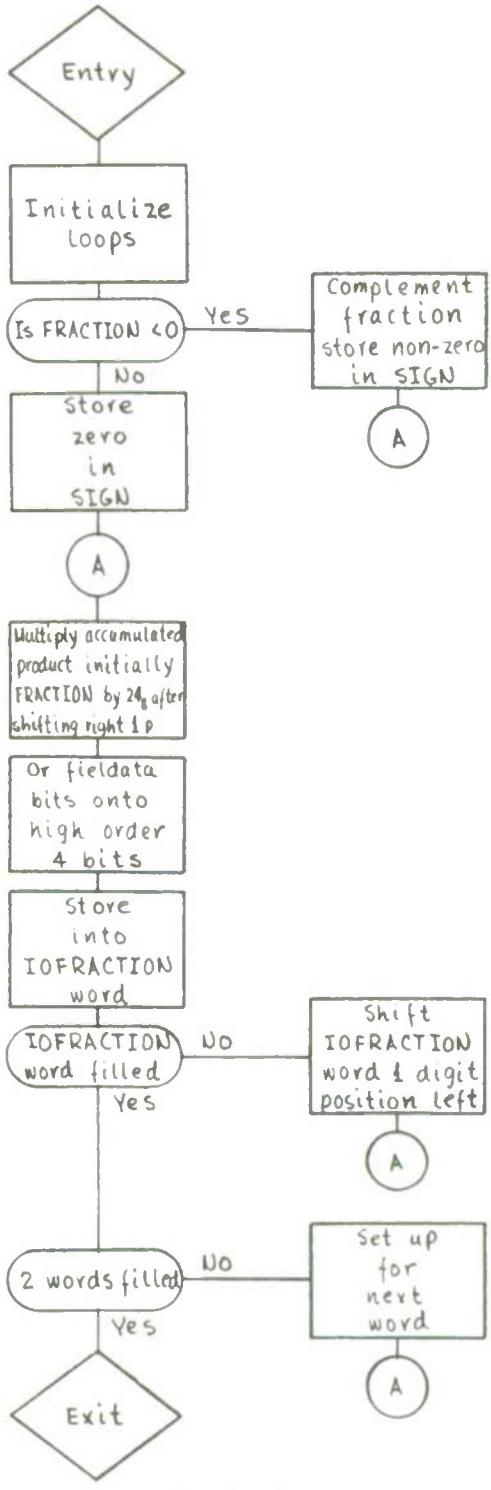
COFRND
Sheet 1 of 2



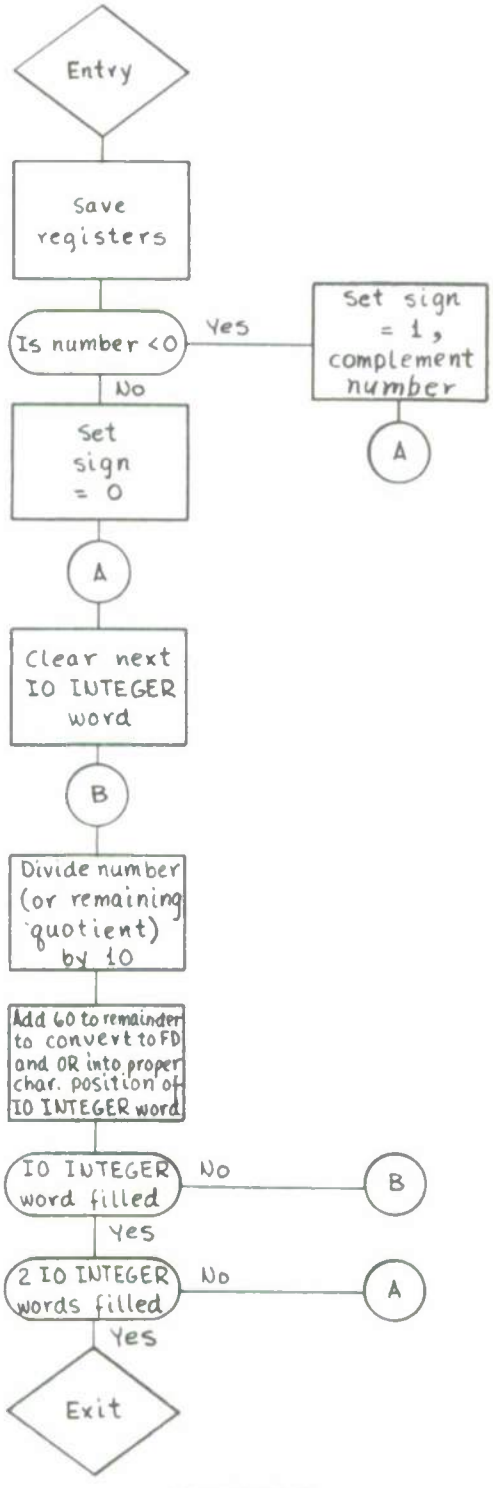
COFRWD
Sheet 2 of 2


Entry
Save registers and adjust exit locations Initialize loop
A
Bring next word
B
Shift and isolate leading digit
Digit = 0
No
Yes
End of word
No
B
Yes
All words done
No
A
Yes
Force in 1 zero
C
End of word
Yes
C
No
Move rest of word together
C
Store back in original location
Exit

SUPZRO


Entry
Initialize loops
Is FRACTION <0
Yes
Complement fraction store non-zero in SIGN
A
No
Store zero in SIGN
A
Multiply accumulated product initially FRACTION by 2^6 after shifting right 1 p
Or fieldata bits onto high order 4 bits
Store into IOFRACTION word
IOFRACTION word filled
No
Shift IOFRACTION word 1 digit position left
A
Yes
2 words filled
No
Set up for next word
A
Yes
Exit

BINDECFRA


Entry
Save registers
Is number <0
Yes
Set sign = 1, complement number
A
No
Set sign = 0
A
Clear next IO INTEGER word
B
Divide number (or remaining quotient) by 10
Add 60 to remainder to convert to FD and OR into proper char. position of IO INTEGER word
IO INTEGER word filled
No
B
Yes
2 IO INTEGER words filled
No
A
Yes
Exit

BINDECINT

```
CARDS    LI ID LABEL      TA STATEMENT                                  LOC    F JKB Y      NOTES

   .     00000 PPKG           PROGRAM   AOAMS-ASSOC•1JULY65
   .     00001 KEYIN          MEANS     C2
   .     00002 KEYOUT         MEANS     C2
   .     00003 NIL            EQUALS    0
   .     00004                COMMENT   ROUTINE                                                 TO PRINT AN INTEGER
   .     00005                COMMENT   CALLING                                                 SEQUENCE
   .     00006                COMMENT   RJP                                                     PINT
   .     00007                COMMENT   INDEX•Y
   .     00010                COMMENT   NUMCHAR•COL
   .     00011                COMMENT   ERROR
   .     00012                COMMENT   NORMAL                                                  $
   .     00013 PINT           ENTRY                                   00000 61000 00000
   .     00014                RJP   PENTRY                            00001 65000 00706
   .     00015                JP    PINTERR                           00002 61000 00050
   .     00016                ENT   A•W(B6)                           00003 11036 00000
   .     00017                STR   A•W(INTEGER)                      00004 15030 02234
   .     00020                RJP   BINDECINT                         00005 65000 01327   CONVERT TO DECIMAL
   .     00021                RJP   SUPZRO                            00006 65000 01457   SUPPRESS LEADING ZEROS
   .     00022                U-TAG     IOINTEGER•2                   00007 02241 00002
   .     00023                RJP   PLAYUP                            00010 65000 00730   COUNT AND STORE SIGNIFICANT
   .     00024                U-TAG     IOINTEGER•2                   00011 02241 00002   DIGITS
   .     00025                ENT   A•U(1+B7)•ANDT                    00012 11527 00001   EXAMINE NUMBER OF PLACES (N)
   .     00026                JP    PINTB                             00013 61000 00024   IF 0 SKIP BUMPING CTR
   .     00027                SUB   A•W(CHARNO)•APOS                  00014 21630 01170   N-CHARNO=NO. OF PRINTABLE DIGI
                                                                                          TS
   .     00030                JP    PINTERRA                          00015 61000 00051   IF CHARNO GRTR N, ERROR
   .     00031                JP    PINTB•AZERO                       00016 60400 00024
   .     00032                STR   A•W1$+21                          00017 15030 00021
   .     00033                RJP   PBLANK                            00020 65000 00237   INSERT N-CHARNO-1 BLANKS
   .     00034                0     0                                 00021 00000 00000
   .     00035                JP    PINTERR                           00022 61000 00050
   .     00036                ENT   B1•LIPCOLUMN1                     00023 12110 00666
   .     00037 PINTB          ENT   A•W(SIGN1•AZERO                   00024 11430 02236
   .     00040                ENT   A•41                              00025 11000 00041
   .     00041                STR   A•L(PBUF+B11                      00026 15011 02337
   .     00042                BSK   B1•1290                           00027 71100 00201
   .     00043                JP    $+2                               00030 61000 00032
   .     00044                JP    PINTERR                           00031 61000 00050
   .     00045                ENT   B6•1                              00032 12600 00001
   .     00046 PINTC          ENT   A•W(LAYUPSTOR+B6-11               00033 11036 00764
   .     00047                STR   A•L(PBUF+B11                      00034 15011 02337
   .     00050                BSK   B1•1290                           00035 71100 00201
   .     00051                JP    $+2                               00036 61000 00040
   .     00052                JP    PINTERR                           00037 61000 00050
   .     00053                BSK   B6•W(CHARNO)                      00040 71630 01170
   .     00054                JP    PINTC                             00041 61000 00033
   .     00055 PINTEXIT       RPL   Y+1•LIPINT)                       00042 36010 00000   ADJUST EXIT LOCATION
   .     00056                RPL   Y+1•L(PINT)                       00043 36010 00000
   .     00057                RPL   Y+1•L(PINT)                       00044 36010 00000
   .     00060                STR   B1•W(PCOLUMN)                     00045 16130 00666
   .     00061                RJP   PRESTORE                          00046 65000 01241   ADJUST EXIT LOCATION
   .     00062                EXIT                                    00047 61010 00000   NORMAL EXIT
   .     00063 PINTERR        ENT   A•W(PINTERR1)•SKIP                00050 11130 00054
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CARDS	LI TD	LABEL	TA	STATEMENT	LOC	F JKB Y	NOTES
.	C0064	PINTERRA		ENT A•W(PINTERR2)	00051	11030 00055	
.	C0065			RJP PERRORR	00052	65000 01256	
.	00066			JP PINTEXIT+1	00053	61000 00043	ERROR EXIT
.	00067	PINTERR1		00001 PINT	00054	00001 00000	
.	C007C	PINTERR2		00002 PINT	00055	00002 00000	
.	00071			COMMENT			$
.	00072			COMMENT ROUTINE			TO CONVERT AND STORE THE OCTAL DIGITS
.	C0073			COMMENT OF			A WORD IN THE PRINT BUFFER.
.	C0074			COMMENT CALLING			SEQUENCE
.	00075			COMMENT RJP			POCT
.	00076			COMMENT INDEX•Y			
.	C0077			COMMENT NUMCHAR•COL			
.	00100			COMMENT ERROR			
.	00101			COMMENT NORMAL			$
.	C0102	POCT		ENTRY	00056	61000 00000	
.	C0103			RJP PENTRY	00057	65000 00706	
.	00104			JP POCTERR	00060	61000 00107	
.	00105			ENT A•W(B6)	00061	11036 00000	PLACE ARG IN INTEGER
.	00106			STR A•W(INTEGER)	00062	15030 02234	
.	C0107			RJP BINOCTFLD	00063	65000 01360	CONVERT TO FIELDATA
.	00110			RJP PLAYUP	00064	65000 00730	
.	00111			U-TAG IOINTEGER•2	00065	02241 00002	
.	00112			ENT A•U(1+B7)•ANDT	00066	11527 00001	GET N
.	C0113			ENT A•100	00067	11000 00012	IF 0 IMPLIES 10
.	00114			SUB A•100	00070	21000 00012	
.	00115			CP A•	00071	15040 00000	TAKE 10-N
.	00116			ENT B7•A	00072	12770 00000	
.	C0117	POCTA		ENT A•W(LAYUPSTOR+B7)	00073	11037 00765	GET LOWER N DIGITS
.	00120			STR A•L(PBUF+B1)	00074	15011 02337	
.	00121			BSK B1•1290	00075	71100 00201	
.	00122			JP $+2	00076	61000 00100	
.	C0123			JP POCTERR	00077	61000 00107	
.	00124			BSK B7•90	00100	71700 00011	
.	00125			JP POCTA	00101	61000 00073	
.	00126			ENT A•3	00102	11000 00003	
.	C0127	POCTB		RPL A+Y•L(POCT)	00103	24010 00056	
.	00130			STR B1•W(PCOLUMN)	00104	16130 00666	
.	00131			RJP PRESTORE	00105	65000 01241	
.	C0132			EXIT	00106	61010 00056	
.	00133	POCTERR		ENT A•W(POCTERR1)	00107	11030 00113	
.	00134			RJP PERRORR	00110	65000 01256	
.	00135			ENT A•2	00111	11000 00002	
.	00136			JP POCTB	00112	61000 00103	
.	C0137	POCTERR1		00001 POCT	00113	00001 00056	
.	00140			COMMENT			$
.	00141			COMMENT ROUTINE			TO CONVERT A FIXED POINT NUMBER AND
.	C0142			COMMENT PLACE			IT IN THE PRINT BUFFER.
.	00143			COMMENT CALLING			SEQUENCE
.	00144			COMMENT RJP			PFIX
.	00145			COMMENT INDEX•Y			
.	C0146			COMMENT BINPT•COL			

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CAROS    LI ID LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES

   .     C0147            COMMENT   NUMCHARINT•                                        NUMCHARFRAC
   .     00150            COMMENT   ERROR
   .     C0151            COMMENT   NORMAL                                             $
   .     00152 PF1X       ENTRY                                       00114  61000 00000
   .     00153            RJP   PENTRY                                00115  65000 00706
   .     00154            JP    PF1XERR                               00116  61000 00166
   .     00155            STR   B6•U(PF1XB)                           00117  16620 00125  STORE ARGUMENT ADDRESS
   .     00156            ENT   A•U(1+B7)                             00120  11027 00001  GET GAMMA
   .     00157            STR   A•L(PF1XB)                            00121  15010 00125
   .     00160            ENT   A•L(2+B7)                             00122  11017 00002  GET BETA
   .     00161            STR   A•W(BETA)                             00123  15030 02233
   .     00162            RJP   COFF1X                                00124  65000 01421  CONVERT NUMBER AND ZERO SUPPRE
                                                                                          SS
   .     C0163 PF1XB      0     0                                     00125  00000 00000
   .     C0164            RJP   PLAYUP                                00126  65000 00730  SPREAD OUT SUPPRESSED INTEGER
   .     C0165            U-TAG      101NTEGER•2                      00127  02241 00002
   .     C0166            ENT   A•U(2+B7)                             00130  11027 00002  GET NO OF INTEGERS TO PRINT
   .     C0167            SUB   A•W(CHARNO)•APOS                      00131  21630 01170  SUBTRACT NO OF SIGNIFICANT
   .     C0170            JP    PF1XERRA                              00132  61000 00167  DIGITS, IF GRTR, ERROR
   .     C0171            JP    PF1XC•AZERO                           00133  60400 00140
   .     C0172            STR   A•L($+2)                              00134  15010 00136
   .     C0173            RJP   PBLANK                                00135  65000 00237  INSERT N-CHARNO-1 BLANKS
   .     C0174            0     0                                     00136  00000 00000
   .     C0175            JP    PF1XERR                               00137  61000 00166
   .     00176 PF1XC      ENT   A•W(SIGN)•AZERO                       00140  11430 02236
   .     C0177            ENT   B1•L(PCOLUMN)                         00141  12110 00666
   .     C0200            ENT   A•41                                  00142  11000 00041
   .     00201            STR   A•L(PBUF+B11                          00143  15011 02337
   .     00202            BSK   B1•1290                               00144  71100 00201
   .     C0203            JP    $+2                                   00145  61000 00147
   .     C0204            JP    PF1XERR                               00146  61000 00166
   .     00205            ENT   B6•1                                  00147  12500 00001
   .     00206 PF1XO      ENT   A•W(LAYUPSTOR+B6-1)                   00150  11036 00764
   .     00207            STR   A•L(PBUF+B1)                          00151  15011 02337
   .     C0210            BSK   B1•1290                               00152  71100 00201
   .     C0211            JP    $+2                                   00153  61000 00155
   .     C0212            JP    PF1XERR                               00154  61000 00166
   .     C0213            BSK   B6•W(CHARNO)                          00155  71630 01170
   .     C0214            JP    PF1XO                                 00156  61000 00150
   .     C0215            RJP   PFRACSTOR                             00157  65000 01171
   .     C0216            JP    PF1XERR                               00160  61000 00166
   .     00217 PF1XF      ENT   A•4                                   00161  11000 00004  NORMAL EXIT
   .     C022C            RPL   A+Y•L(PF1X)                           00162  24010 00114  COMMON EXIT PATH
   .     00221            STR   B1•W(PCOLUMN)                         00163  16130 00666
   .     00222            RJP   PRESTORE                              00164  65000 01241
   .     C0223            EXIT                                        00165  61010 00114
   .     C0224 PF1XERR    ENT   A•W(PF1XERR1)•SKIP                    00166  11130 00173
   .     00225 PF1XERRA   ENT   A•W(PF1XERR2)                         00167  11030 00174
   .     C0226            RJP   PFRORR                                00170  65000 01256
   .     C0227            ENT   A•3                                   00171  11000 00003
   .     C0230            JP    PF1XF+1                               00172  61000 00162  ERROR EXIT
   .     00231 PF1XERR1   00001      PF1X                            00173  00001 00114
   .     00232 PF1XERR2   00002      PF1X                            00174  00002 00114
```

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              ........................  SPURT OUTPUT NO. 210      ........................
                         PPKG                  AOAMS-ASSOC*1JULY65

CAROS   L1 10 LABEL      TA STATEMENT                            LOC    F JKB Y      NOTES

  .     00233               COMMENT                                                  $
  .     00234               COMMENT    ROUTINE                                       TO PRINT FIELD OATA OATA
  .     00235               COMMENT    CALLING                                       SEQUENCE
  .     00236               COMMENT    RJP                                           PFO
  .     00237               COMMENT    INOEX*Y
  .     00240               COMMENT    NUMCHAR*COL
  .     00241               COMMENT    ERROR
  .     00242               COMMENT    NORMAL                                        $
  .     00243 PFD           ENTRY                               00175  61000 00000
  .     00244               RJP   PENTRY                        00176  65000 00706
  .     00245               JP    PFOERR                        00177  61000 00232
  .     00246               STR   B6*L(PFOA)                    00200  16610 00207   STORE AOORELL OF STRING
  .     00247               ENT   A*U(1+B7)*ANOT                00201  11527 00001   GET NO. OF CHARACTERS
  .     00250               ENT   A*5                           00202  11000 00005   IF ZERO, EQUALS 5
  .     00251               STR   A*L(PFOB)                     00203  15010 00216
  .     00252               ENT   B7*1                          00204  12700 00001
  .     00253               ENT   B6*0                          00205  12600 00000
  .     00254               ENT   B5*0                          00206  12500 00000
  .     00255 PFOA          ENT   Q*W(00+B5)                    00207  10035 00000   GET NEXT FO WORO
  .     00256               CL    A*                            00210  11000 00000
  .     00257               LSH   AQ*6                          00211  07000 00006
  .     00260               STR   A*L(PBUF+B1)                  00212  15011 02337
  .     00261               BSK   B1*1290                       00213  71100 00201
  .     00262               JP    $+2                           00214  61000 00216
  .     00263               JP    PFOERR                        00215  61000 00232
  .     00264 PFOB          BSK   B7*00                         00216  71700 00000
  .     00265               JP    $+2                           00217  61000 00221
  .     00266               JP    PFOC                          00220  61000 00225
  .     00267               BSK   B6*4                          00221  71600 00004
  .     00270               JP    PFOA+1                        00222  61000 00210
  .     00271               BSK   B5*-1                         00223  71500 77776
  .     00272               JP    PFOA                          00224  61000 00207
  .     00273 PFOC          ENT   A*3                           00225  11000 00003
  .     00274               RPL   A+Y*L(PFO)                    00226  24010 00175
  .     00275               STR   B1*W(PCOLUMN)                 00227  16130 00666
  .     00276               RJP   PRESTORE                      00230  65000 01241
  .     00277               EXIT                                00231  61010 00175
  .     00300 PFOERR        ENT   A*W(PFOERR1)                  00232  11030 00236
  .     00301               RJP   PERRORR                       00233  65000 01256
  .     00302               ENT   A*2                           00234  11000 00002
  .     00303               JP    PFOC+1                        00235  61000 00226
  .     00304 PFOERR1       00001      PFO                      00236  00001 00175
  .     00305               COMMENT                                                  $
  .     00306               COMMENT    ROUTINE                                       TO BLANK AN AREA OF
  .     00307               COMMENT    THE                                           OUTPUT BUFFER
  .     00310               COMMENT    CALLING                                       SEQUENCE
  .     00311               COMMENT    RJP                                           PBLANK
  .     00312               COMMENT    COL*NUMCOLS
  .     00313               COMMENT    ERROR
  .     00314               COMMENT    NORMAL                                        $
  .     00315 PBLANK        ENTRY                               00237  61000 00000
  .     00316               STR   A*W(PBLANK5)                  00240  15030 00304
  .     00317               STR   Q*W(PBLANK6)                  00241  14030 00305   SAVE ALL REGISTERS
```

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CAROS    LI IO LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES
.     00320               STR  B7*L(PBLANK2+11                       00242  16710 00273
.     00321               STR  B1*L(PBLANK2+21                       00243  16110 00274
.     00322               ENT  B7*L(PBLANK1                          00244  12710 00237  PARAMETER LOCATION
.     C0323               ENT  A*U(B71*ANOT                          00245  11527 00000
.     C0324               JP   PBLANK05                              00246  61000 00253  COL IS ZERO
.     00325               STR  A*L($+21                              00247  15010 00251  BUILD PCOLR CALLING SEQUENCE
.     00326               RJP  PCOLR                                 00250  65000 00306
.     C0327               00   00                                    00251  00000 00000
.     00330               JP   PBLANK3                               00252  61000 00300
.     00331 PBLANK05      ENT  A*L(B71*AZERO                         00253  11417 00000
.     00332               JP   $+3                                   00254  61000 00257
.     C0333               ENT  A*1280                                00255  11000 00200
.     00334               SUB  A*W(PCOLUMN1                          00256  21030 00666
.     00335               ENT  B7*A                                  00257  12770 00000  NUMBER OF COLUMNS TO BLANK
.     00336               BJP  B7*$+1                                00260  72700 00261
.     C0337               ENT  B1*L(PCOLUMN1                         00261  12110 00666
.     00340 PBLANK1       CL   A*                                    00262  11000 00000
.     00341               STR  A*L(PBUF+B1)                          00263  15011 02337
.     00342               BSK  B1*1290                               00264  71100 00201
.     C0343               JP   $+2                                   00265  61000 00267
.     00344               JP   PBLANK3                               00266  61000 00300
.     00345               BJP  B7*PBLANK1                            00267  72700 00262
.     00346               STR  B1*W(PCOLUMN1                         00270  16130 00666
.     C0347               RPL  Y+1*L(PBLANK1                         00271  36010 00237  PREPARE EXIT
.     00350 PBLANK2       RPL  Y+1*L(PBLANK1                         00272  36010 00237
.     00351               ENT  B7*00                                 00273  12700 00000
.     00352               ENT  B1*00                                 00274  12100 00000
.     C0353               ENT  A*W(PBLANK51                          00275  11030 00304
.     C0354               ENT  Q*W(PBLANK61                          00276  10030 00305
.     00355               EXIT                                       00277  61010 00237
.     00356 PBLANK3       ENT  A*W(PBLANK41                          00300  11030 00303  ERROR ROUTINE PARAMETER
.     C0357               RJP  PERRORR                               00301  65000 01256
.     00360               JP   PBLANK2                               00302  61000 00272
.     00361 PBLANK4       00001      PBLANK                          00303  00001 00237
.     00362 PBLANK5       0    0                                     00304  00000 00000
.     C0363 PBLANK6       0    0                                     00305  00000 00000
.     00364               COMMENT                                                       $
.     00365               COMMENT    ROUTINE                                            TO RESET THE COLUMN COUNTER
.     00366               COMMENT    CALLING                                            SEQUENCE
.     C0367               COMMENT    RJP                                                PCOLR
.     00370               COMMENT    INDEX*COL
.     00371               COMMENT    ERROR
.     00372               COMMENT    NORMAL                                             $
.     C0373 PCOLR         ENTRY                                      00306  61000 00000
.     00374               STR  A*W(PCOLRG1                           00307  15030 00334
.     00375               STR  B7*L(PCOLR11                          00310  16710 00315
.     00376               ENT  B7*L(PCOLR1                           00311  12710 00306  LOC OF PARAMETERS
.     C0377               ENT  A*W(B71                               00312  11037 00000  T,Y TO A
.     00400               SEL  SET*W(PCOLR41                         00313  50030 00332  OF IN AN ENT A INST
.     00401               STR  A*W($+21                              00314  15030 00316
.     00402 PCOLR1        ENT  B7*0                                  00315  12700 00000
.     C0403               0    0                                     00316  00000 00000  ENT A WITH COUNTER VALUE
.     00404               COM  A*1290*YMORE                          00317  04700 00201  TEST FOR LINE OVERFLOW
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CAROS    L1 IO LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES
.        00405            JP   PCOLR3                                00320  61000 00326  TOO BIG, ERROR
.        C0406            STR  A•W(PCOLUMN1                          00321  15030 00666  SET COUNTER
.        C0407            RPL  Y+1•L(PCOLR1                          00322  36010 00306
.        00410 PCOLR2     RPL  Y+1•L(PCOLR1                          00323  36010 00306
.        00411            ENT  A•W(PCOLRG)                           00324  11030 00334
.        C0412            EXIT                                       00325  61010 00306
.        00413 PCOLR3     ENT  A•W(PCOLR51                           00326  11030 00333  PARAMETER WORD FOR ERROR ROUTI
                                                                                       NE
.        00414            RJP  PERRORR                               00327  65000 01256
.        C0415            CL   W(PCOLUMN1                            00330  16030 00666
.        00416            JP   PCOLR2                                00331  61000 00323
.        00417 PCOLR4     ENT  A•0                                   00332  11000 00000
.        00420 PCOLR5     00001      PCOLR                           00333  00001 00306
.        C0421 PCOLRG     0    0                                     00334  00000 00000
.        00422            COMMENT                                                   $
.        00423            COMMENT    ROUTINE                                        TO INCREMENT AND TEST
.        00424            COMMENT    THE                                            COLUMN COUNTER
.        C0425            COMMENT    CALLING                                        SEQUENCE
.        00426            COMMENT    RJP                                            PCOLIN
.        00427            COMMENT    INDEX•NUMCOLS
.        00430            COMMENT    ERROR
.        C0431            COMMENT    NORMAL                                         $
.        00432 PCOLIN     ENTRY                                      00335  61000 00000
.        00433            STR  A•W(PCOLIN51                          00336  15030 00364
.        00434            STR  B7•L(PCOLIN11                         00337  16710 00344
.        00435            ENT  B7•L(PCOLIN1                          00340  12710 00335  LOC OF PARAMETERS
.        00436            ENT  A•W(B71                               00341  11037 00000  T,Y
.        00437            SEL  SET•W(PCOLIN31                        00342  50030 00362  OR IN AN ENT A INST
.        00440            STR  A•W($+2)                              00343  15030 00345
.        C0441 PCOLIN1    ENT  B7•0                                  00344  12700 00000
.        00442            0    0                                     00345  00000 00000  VALUE OF INCREMENT TO A
.        00443            A00  A•W(PCOLUMN1                          00346  20030 00666
.        00444            COM  A•1290•YMORE                          00347  04700 00201  TEST FOR LINE OVERFLOW
.        00445            JP   PCOLIN2                               00350  61000 00356  TOO MANY CHARACTERS, ERROR
.        00446            STR  A•W(PCOLUMN1                          00351  15030 00666  OK, STORE NEW COLUMN NUMBER
.        00447            RPL  Y+1•L(PCOLIN1                         00352  36010 00335  PREPARE EXIT
.        00450 PCOLIN1A   RPL  Y+1•L(PCOLIN1                         00353  36010 00335
.        C0451            ENT  A•W(PCOLIN51                          00354  11030 00364
.        00452            EXIT                                       00355  61010 00335
.        00453 PCOLIN2    ENT  A•W(PCOLIN41                          00356  11030 00363  PARAMETER WORD FOR ERROR ROUTI
                                                                                       NE
.        C0454            RJP  PERRORR                               00357  65000 01256
.        00455            CL   W(PCOLUMN1                            00360  16030 00666
.        00456            JP   PCOLIN1A                              00361  61000 00353  ERROR EXIT
.        00457 PCOLIN3    ENT  A•0                                   00362  11000 00000
.        C0460 PCOLIN4    00001      PCOLIN                          00363  00001 00335
.        00461 PCOLIN5    0    0                                     00364  00000 00000
.        00462            COMMENT                                                   $
.        00463            COMMENT    ROUTINE                                        TO DEFINE THE OUTPUT
.        C0464            COMMENT    BUFFER                                         ORIGIN
.        00465            COMMENT    CALLING                                        SEQUENCE
.        00466            COMMENT    RJP                                            PIMAGE
.        00467            COMMENT    INDEX•Y
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CAROS    LI ID LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES
.        C0470                COMMENT   ERROR
.        C0471                COMMENT   NORMAL                                          $
.        C0472 PIMAGE         ENTRY                                 00365  61000 00000
.        C0473                STR  A+W(PIMAGE3)                     00366  15030 00410
.        C0474                STR  B7+L1PIMAGE1)                    00367  16710 00404
.        C0475                ENT  B7+L1PIMAGE)                     00370  12710 00365
.        C0476                ENT  A+W1B71                          00371  11037 00000
.        C0477                SEL  SET+W(PIMAGE2)                   00372  50030 00407
.        C0500                STR  A+W($+1)                         00373  15030 00374
.        C0501                00   00                               00374  00000 00000  ENT A WITH ADDRESS OF BUFFER
.        C0502                STR  A+L1$+2)                         00375  15010 00377
.        C0503                ENT  B7+1270                          00376  12700 00177
.        C0504                ENT  A+W(00+B71                       00377  11037 00000
.        C0505                STR  A+W1PBUF+1+B7)                   00400  15037 02340
.        C0506                BJP  B7+$-2                           00401  72700 00377
.        C0507                RPL  Y+1+L1PIMAGE1                    00402  36010 00365
.        C051C                RPL  Y+1+L(PIMAGE1                    00403  36010 00365
.        C0511 P1MAGE1        ENT  B7+00                            00404  12700 00000
.        00512                ENT  A+W1PIMAGE3)                     00405  11030 00410
.        C0513                EXIT                                  00406  61010 00365
.        C0514 P1MAGE2        ENT  A+B0                             00407  11000 00000
.        C0515 P1MAGE3        0    0                                00410  00000 00000
.        00516                COMMENT                                                   $
.        C0517                COMMENT   ROUTINE                                         TO SET TOP AND BOTTOM MARGINS
                                                                                        OF
.        C0520                COMMENT   PRINTED                                         PAGE.
.        C0521                COMMENT   CALLING                                         SEQUENCE
.        00522                COMMENT   RJP                                             PFORM
.        C0523                COMMENT   LINESTOP+LINESBOT
.        C0524                COMMENT   ERROR
.        C0525                COMMENT   NORMAL                                          $
.        C0526 PFORM          ENTRY                                 00411  61008 00000
.        C0527                STR  A+W(PFORASTOR)                   00412  15030 00500
.        C0530                STR  B7+L1PFORBSTR1                   00413  16710 00476
.        00531                ENT  B7+L1PFORM1                      00414  12710 00411  GET PARAMETER NO ADDRESS
.        C0532                ENT  A+U1B71                          00415  11027 00000  GET NO OF BLANK LINES AT TOP
.        C0533                ADD  A+1                              00416  20000 00001
.        C0534                STR  A+W1TOPLINE1                     00417  15030 00671  FORM TOP LINE NO.
.        C0535                ENT  A+L1B71                          00420  11017 00000  GET NO OF BLANKS AT BOTTOM
.        C0536                STR  A+W1BOTMARG)                     00421  15030 00670  SAVE
.        C0537                ADD  A+W1TOPLINE1                     00422  20030 00671
.        00540                COM  A+PAGESIZE+1+YMORE               00423  04700 00103  CHECK FOR MARGINS EXCEEDING
.        00541                JP   PFORMERR                         00424  61000 00474  PAGE SIZE -ERROR
.        00542                ENT  A+PAGESIZE                       00425  11000 00102
.        C0543                SUB  A+W1BOTMARG1                     00426  21030 00670
.        00544                STR  A+W(BOTLINE1                     00427  15030 00672  FORM BOTTOM LINE NO.
.        00545                ENT  A+W1PEXTINT1                     00430  11030 00665  SET UP PRINT INTERRUPT
.        00546                STR  A+W(231                          00431  15030 00023
.        00547                ENT  A+1                              00432  11000 00001
.        00550                STR  A+W1STATUS1                      00433  15030 00702  INITIALIZE STATUS
.        00551                ENT  A+W1LINCNT1                      00434  11030 00673
.        00552                SUB  A+W(TOPLINE1+ANOT                00435  21530 00671  TEST FOR PAGE TOPPED
.        00553                JP   PFORMERR-1                       00436  61000 00473
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CARDS    LI IO LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES

.     00554               ENT  A•PAGESIZE                            00437  11000 00102  COMPUTE PAGESIZE-LINCNT
.     00555               SUB  A•W(LINCNT)                           00440  21030 00673
.     00556               ADD  A•W(TOPLINE)                          00441  20030 00671  PLUS TOPLINE=NO OF LINES
.     00557               COM  A•PAGESIZE•YLESS                      00442  04600 00102  MODULO PAGSIZE
.     00560               JP   $+3                                   00443  61000 00446
.     00561               SUB  A•PAGESIZE                            00444  21000 00102
.     00562               JP   $-3                                   00445  61000 00442
.     00563               COM  A•77•YMORE                            00446  04700 00077
.     00564               RJP  PSCRIBSS                              00447  65000 00620
.     00565               LSH  A•18D                                 00450  06000 00022
.     00566               SEL  SET•W(PRINTWD)                        00451  50030 00674  CONSTRUCT PRINT ORDER
.     00567               STR  A•W(PSCRIBC)                          00452  15030 00675
.     00570               ENT  A•W(TOPLINE)                          00453  11030 00671
.     00571               STR  A•W(LINCNT)                           00454  15030 00673  RESET LINCNT TO TOP OF PAGE

.     00572               ENT  A•1                                   00455  11000 00001  RESET PCOLUMN
.     00573               STR  A•W(PCOLUMN)                          00456  15030 00666
.     00574               NO-OP                                      00457  12000 00000
.     00575               ENT  A•W(STATUS)•ANOT                      00460  11530 00702  WAIT FOR COMPLETION
.     00576               JP   $-2                                   00461  61000 00457
.     00577               SUB  A•1•AZERO                             00462  21000 00001  CHECK OK STATUS
.     00600               RJP  PSCRIBERR•STOP                        00463  65400 00610
.     00601               CL   W(STATUS)                             00464  16030 00702  CLEAR STATUS WORD
.     00602               EX-FCT    PRINTC•W(PSCRIBC)                00465  13170 00675  ISSUE WITH NO BUFFER
.     00603               OUT  PRINTC•W(PSCRIBSSB)                   00466  74170 00704
.     00604               ENT  A•W(PSCRIBC)                          00467  11030 00675
.     00605               STR  A•W(PSCSAVE)                          00470  15030 00661
.     00606               ENT  A•W(PSCRIBSSB)                        00471  11030 00704
.     00607               STR  A•W(PSDSAVE)                          00472  15030 00662
.     00610               RPL  Y+1•L(PFORM)                          00473  36010 00411
.     00611 PFORMERR      RPL  Y+1•L(PFORM)                          00474  36010 00411
.     00612               ENT  A•W(PFORASTOR)                        00475  11030 00500
.     00613 PFORBSTR      ENT  B7•0                                  00476  12700 00000
.     00614               EXIT                                       00477  61010 00411
.     00615 PFORASTOR     0    0                                     00500  00000 00000
.     00616               COMMENT                                                  $
.     00617               COMMENT   ROUTINE                                        TO PRINT ONE LINE AFTER SPACIN
                                                                                   G OR GOING
.     00620               COMMENT   TO                                             TOP OF NEXT PAGE. IMAGE ADDRES
                                                                                   S IN PREGIONC.
.     00621               COMMENT   CALLING                                        SEQUENCE
.     00622               COMMENT   RJP                                            PSCRIB
.     00623               COMMENT   EJECT•SPACING
.     00624               COMMENT   ERROR
.     00625               COMMENT   NORMAL                                                 $
.     00626 PRINTC        MEANS     C3
.     00627 PSCRIB        ENTRY                                      00501  61000 00000
.     00630               RJP  PSAVE                                 00502  65000 01226
.     00631               ENT  A•W(PEXTINT)                          00503  11030 00665  SET UP PRINT INTERRUPT
.     00632               STR  A•W(23)                               00504  15030 00023
.     00633               ENT  B7•L(PSCRIB)                          00505  12710 00501  GET PARAMETER WD ADDRESS
.     00634               ENT  A•U(B7)•ANOT                          00506  11527 00000  TEST FOR PAGE TOPPING
.     00635               JP   PRSCRIBC                              00507  61000 00575  NO
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CARDS	L1	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	DD636			ENT	A•W(BOTLINE)	00510	11D3D		DD672	YES- COMPJTE LINES TO SKIP
.	00637		PSCR1BA	SUB	A•W(LINCNT1	00511	21D3D		DD673	FOR TOP OF NEXT PAGE
.	D0640			ADD	A•W(BOTMARG1	00512	20D3D		DD670	
.	D0641			ADD	A•W(TOPLINE1	00513	20D3D		D0671	
.	C0642			COM	A•77•YMORE	00514	D4700		00077	
.	0D643			RJP	PSCR1BSS	00515	65D0D		D0620	
.	0D644		PSCR1BB	LSH	A•1BD	00516	D600D		00022	
.	D0645			SEL	SET•W1PRINTWD)	00517	50D3D		00674	INSERT IN PRINT FUNCTION WD
.	C0646			STR	A•W1PSCR1BC1	00520	15D30		00675	
.	D0647			ENT	A•W(TOPLINE1	00521	11030		D0671	RESET LINE COUNT TO TOPLINE
.	C065D			STR	A•W(LINCNT)	00522	15030		00673	
.	00651		PSCR1BF	ENT	B7•D	00523	12700		0D000	CREATE PACKED PRINT BUFFER
.	C0652			ENT	B5•L(PSCR1BD1	00524	1251D		00676	
.	00653		PSCR1BH	ENT	B6•4	0D525	12600		00004	
.	CD654			ENT	A•0	00526	11000		0D000	
.	00655			BSK	B7•129D	00527	71700		0D201	
.	C0656			ENT	Q•W(PBUF+B71•SKIP	00530	10137		D2337	PACK CHARS FROM PBUF
.	D0657			JP	PSCR1BJ	DD531	61000		0D540	
.	CD66D			LSH	Q•24D	00532	05000		0D030	
.	C0661			LSH	AQ•6	D0533	07000		DD006	
.	C0662			BJP	B6•PSCR1BH+2	00534	72600		00527	
.	C0663			STR	A•W(B51	0D535	15035		00000	STORE INTO PACKED BUFFER
.	C0664			BSK	B5•-1	00536	71500		77776	
.	CD665			JP	PSCR1BH	00537	61000		00525	
.	C0666		PSCR1BJ	LSH	A•6	00540	06000		D0006	LEFT JUSTIFY A REG
.	C0667			BJP	B6•$-1	00541	72600		00540	
.	C067C			STR	A•W(B51	00542	15035		0D0D0	
.	C0671		PSCR1BI	ENT	A•1	00543	11000		00001	
.	C0672			STR	A•W1PCOLUMN1	00544	15030		00666	RESET COLUMN COUNTER TO 1
.	C0673		PSCR1BSW	ENT	B0•PSCRBUF	00545	12000		0D562	SWITCH TO SKIP PRINTING
.	C0674			NO-OP		00546	12000		0D000	
.	C0675			ENT	A•W1STATUS)•ANOT	00547	11530		00702	LOOP TILL PRINT COMPLETE
.	C0676			JP	$-2	0D550	61000		00546	
.	C0677			SUB	A•1•AZERO	00551	21400		00001	TEST FOR NORMAL COMPLETION
.	C0700			RJP	PSCR1BERR•STOP	00552	654D0		00610	
.	C07D1			CL	W1STATUS1	00553	16030		00702	
.	C0702			EX-FCT	PRINTC•W1PSCR1BC1	00554	13170		00675	
.	C07D3			OUT	PRINTC•W1PSCR1BO)	00555	74170		00676	
.	C07D4			ENT	Q•W(PSCR1BC1	00556	10030		00675	
.	C0705			STR	Q•W(PSCSAVE1	00557	14030		00661	
.	C0706			ENT	Q•W(PSCR1BO1	00560	10030		00676	
.	C0707			STR	Q•W(PSOSAVE1	00561	14030		00662	
.	C071C		PSCRBUF	ENT	Q•W1TWENTYSIXS1	00562	10030		00667	
.	C0711			ENT	A•L1PSCR1BO)	00563	1101D		00676	EXAMINE LAST BUFFER
.	C0712			STR	A•U(PACKBUFF1	00564	15020		02250	
.	C0713			COM	A•PREGION+2•YMORE	00565	04700		02253	
.	C0714			RPL	Y-Q•W(PSCR1BD)•SKIP	0D566	35130		DD676	
.	C0715			RPL	Y+Q•W(PSCR1BD)	00567	3403D		00676	
.	C0716			STR	A•L(PACKBUFF1	00570	15D10		02250	
.	C0717			RPL	Y+1•L1PSCR1B1	00571	36010		00501	YES- ADJUST EXIT LINE
.	C072C		PSCR1BG	RPL	Y+1•L1PSCR1B1	00572	36010		0D501	
.	C0721			RJP	PRESTORE	00573	65D0D		01241	
.	CC722			EXIT		00574	61010		00501	

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CARDS    L) IC LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES

   .     C0723 PRSCRIBC     ENT  A*W(BOTLINE)                        00575  11030 00672  IF BOTLINE-LINCNT GREATER
   .     C0724              SUB  A*W(LINCNT)                         00576  21030 00673  THAN NO OF LINES TO SHIP, FINE

   .     C0725              COM  A*L(B7)*YLESS                       00577  04617 00000
   .     C0726              JP   PSCRIBA+1                           00600  61000 00512  ELSE GO TO TOP PAGE
   .     C0727              ENT  A*L(B7)                             00601  11017 00000  BUMP LINE COUNTER
   .     C073C              RPL  A+Y*W(LINCNT)                       00602  24030 00673
   .     C0731              ENT  A*L(B7)                             00603  11017 00000  GET NO OF SPACES
   .     C0732              LSH  A*180                               00604  06000 00022
   .     C0733              SEL  SET*W(PRINTWO)                      00605  50030 00674  INSERT IN PRINT FUNCTION WO
   .     C0734              STR  A*W(PSCRIBC)                        00606  16030 00675
   .     C0735              JP   PSCRIBF                             00607  61000 00523  GO TO PRINT OUT
   .     C0736 PSCRIBERR    ENTRY                                    00610  61000 00000
   .     C0737              ENT  A*L(PSCRIBERR)                      00611  11010 00610
   .     C074C              SUB  A*5                                 00612  21000 00005
   .     C0741              STR  A*L(PSCRIBERR)                      00613  15010 00610
   .     C0742              CL   W(STATUS)                           00614  16030 00702
   .     C0743              EX-FCT    PRINTC*W(PSCSAVE)              00615  13170 00661
   .     C0744              OUT  PRINTC*W(PSOSAVE)                   00616  74170 00662
   .     C0745              EXIT                                     00617  61010 00610
   .     C0746 PSCRIBSS     ENTRY                                    00620  61000 00000
   .     C0747              SUB  A*77                                00621  21000 00077
   .     C075C              COM  A*77*YMORE                          00622  04700 00077
   .     C0751              JP   $-2                                 00623  61000 00621
   .     C0752              ENT  B7*A                                00624  12770 00000
   .     C0753              NO-OP                                    00625  12000 00000
   .     C0754              ENT  A*W(STATUS)*ANOT                    00626  11530 00702
   .     C0755              JP   $-2                                 00627  61000 00625
   .     C0756              SUB  A*1*AZERO                           00630  21400 00001
   .     C0757              RJP  PSCRIBERR*STOP                      00631  65400 00610
   .     C076C              CL   W(STATUS)                           00632  16030 00702
   .     C0761              EX-FCT    PRINTC*W(PSCRIBSSA)            00633  13170 00703
   .     C0762              OUT  PRINTC*W(PSCRIBSSB)                 00634  74170 00704
   .     C0763              ENT  A*W(PSCRIBSSA)                      00635  11030 00703
   .     C0764              STR  A*W(PSCSAVE)                        00636  16030 00661
   .     C0765              ENT  A*W(PSCRIBSSB)                      00637  11030 00704
   .     C0766              STR  A*W(PSOSAVE)                        00640  15030 00662
   .     C0767              ENT  A*B7                                00641  11007 00000
   .     C077C              EXIT                                     00642  61010 00620
   .     C0771 PSCRINT      ENTRY                                    00643  61000 00000  PRINT INTERRUPT ROUTINE
   .     C0772              STR  A*W(PSCRASTOR)                      00644  15030 00663
   .     C0773              STR  Q*W(PSCRQSTOR)                      00645  14030 00664
   .     C0774              STR  PRINTC*W(STATSTOR)                  00646  17170 00701  SAVE STATUS WORD
   .     C0775              ENT  Q*W(STATSTOR)                       00647  10030 00701
   .     C0776              CL   A*                                  00650  11000 00000
   .     C0777              LSH  AQ*4                                00651  07000 00004
   .     C1CCC              SUB  A*10*ANOT                           00652  21500 00010  TEST BOTTOM 4 BITS
   .     C1CC1              ENT  A*1*SKIP                            00653  11100 00001
   .     C1CC2              ENT  A*2                                 00654  11000 00002  OTHERWISE,ENTER ERROR CODE
   .     C1CC3              STR  A*W(STATUS)                         00655  15030 00702  INTO STATUS WORD
   .     C1CC4              ENT  A*W(PSCRASTOR)                      00656  11030 00663
   .     C1CC5              ENT  Q*W(PSCRQSTOR)                      00657  10030 00664
   .     C1CC6              RILJP     L(PSCRINT)                     00660  60110 00643  EXIT
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CARCS    LI IC LABEL      TA STATEMENT                                  LOC    F JKB Y      NOTES

    .    C1CC7 PSCSAVE       0    0                                    00661  00000 00000
    .    C1C1C PSCSAVE       0    0                                    00662  00000 00000
    .    C1C11 PSCRASTOR     0    0                                    00663  00000 00000
    .    C1C12 PSCRQSTOR     0    0                                    00664  00000 00000
    .    C1C13 PEXTINT       RJP  PSCRINT                              00665  65000 00643  INSTR. FOR PRINT INTERRUPT
    .    C1C14 PCOLUMN       0    1                                    00666  00000 00001
    .    C1C15 TWENTYSIXS    00033     00033                           00667  00033 00033
    .    C1C16 BOTMARG       0    4                                    00670  00000 00004
    .    C1C17 TOPLINE       0    7                                    00671  00000 00007
    .    C1C2C BOTLINE       0    62D                                  00672  00000 00076
    .    C1021 LINCNT        0    1                                    00673  00000 00001
    .    C1C22 PRINTWD       12000     00001                           00674  12000 00001
    .    C1C23 PSCRIBC       0    0                                    00675  00000 00000
    .    C1C24 PSCRIBC       U-TAG     PREGION+260*PREGION+1           00676  02303 02252
    .    C1C25 PSCASTOR      0    0                                    00677  00000 00000
    .    C1C26 PSCQSTOR      0    0                                    00700  00000 00000
    .    C1C27 STATSTOR      0    0                                    00701  00000 00000
    .    C1C3C STATUS        0    1                                    00702  00000 00001
    .    C1C31 PSCRIBSSA     12770     00001                           00703  12770 00001
    .    C1032 PSCRIBSSB     U-TAG     PSCRIBSSC*PSCRIBSSC             00704  00705 00705
    .    C1C33 PSCRIBSSC     77777     77777                           00705  77777 77777
    .    C1C34 PAGESIZE      EQUALS    66D
    .    C1035               COMMENT                                                 $
    .    C1C36               COMMENT   SUBROUTINE                                    FOR CONVERSION ROUTINES TO PER
                                                                                     FORM
    .    C1C37               COMMENT   ENTRY                                         PROCEDURES, SET COLUMN CTR AND
                                                                                     GET ADDRESS
    .    C1C4C               COMMENT   OF                                            ARGUMENT.
    .    C1C41 PENTRY        ENTRY                                     00706  61000 00000
    .    C1C42               RJP  PSAVE                                00707  65000 01226
    .    C1C43               ENT  B7*L(PENTRY)                         00710  12710 00706
    .    C1C44               ENT  B7*L(B7-2)                           00711  12717 77775  GET ADDRESS OF MAIN CALLER
    .    C1C45               ENT  A*W(B7)                              00712  11037 00000
    .    C1C46               SEL  SET*W(GETADD)                        00713  50030 00727
    .    C1C47               STR  A*W(PENTA+1)                         00714  15030 00724
    .    C1C5C               ENT  A*L(1+B7)*ANOT                       00715  11517 00001
    .    C1C51               JP   PENTA                                00716  61000 00723
    .    C1C52               STR  A*W(S+2)                             00717  15030 00721
    .    C1C53               RJP  PCOLR                                00720  65000 00306
    .    C1C54               0    0                                    00721  00000 00000
    .    C1C55               JP   $+2                                  00722  61000 00724
    .    C1C56 PENTA         RPL  Y+1*L(PENTRY)                        00723  36010 00706
    .    C1C57               0    0                                    00724  00000 00000
    .    C1C6C               ENT  B1*L(PCOLUMN)                        00725  12110 00666
    .    C1C61               EXIT                                      00726  61010 00706
    .    C1C62 GETADD        ENT  B6*0                                 00727  12600 00000
    .    C1063 PLAYUP        ENTRY                                     00730  61000 00000
    .    C1C64               STR  B7*L(PLAYBSTOR)                      00731  16710 00760  SAVE B-REGS
    .    C1C65               STR  B6*L(PLAYBSTOR+1)                    00732  16610 00761
    .    C1C66               STR  B5*L(PLAYBSTOR+2)                    00733  16510 00762
    .    C1C67               CLEAR     1300*LAYUPSTOR                  00734  70100 00202
                                                                       00735  16030 00765
    .    C1C7C               ENT  B7*L(PLAYUP)                         00736  12710 00730
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CARDS    LI IC LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES

   .     C1C71                ENT  B6•U(B7)                          00737  12627 00000  GET ADDRESS OF 1ST WORD
   .     C1C72                ENT  B7•L(B7)                          00740  12717 00000
   .     C1C73                STR  B6•L(PLAYUPA)                     00741  16610 00744
   .     C1C74                ENT  B6•0                              00742  12600 00000
   .     C1C75                ENT  B5•0                              00743  12500 00000
   .     C1C76 PLAYUPA        ENT  Q•W(0+B6)                         00744  10036 00000  BRING 1ST WORD
   .     C1077                ADD  Q•0•QNOT                          00746  26500 00000  TEST FOR 0
   .     C11CC                JP   PLAYUPB                           00746  61000 00755
   .     C11C1                CL   A•                                00747  11000 00000
   .     C1102                LSH  AQ•6•ANOT                         00750  07500 00006  IF NOT GET NEXT MSD
   .     C1103                JP   PLAYUPA+1                         00751  61000 00745
   .     C1104                STR  A•W(LAYUPSTOR+B5)                 00752  15035 00765  STORE IN NEXT SLOT
   .     C1105                BSK  B5•LAYUPLMT                       00753  71500 00202
   .     C1106                JP   PLAYUPA+1                         00754  61000 00745
   .     C1107 PLAYUPB        BSK  B6•B7-1                           00755  71607 77776
   .     C111C                JP   PLAYUPA                           00756  61000 00744  TILL ALL WORDS DONE
   .     C1111                STR  B5•W(CHARNO)                      00757  16530 01170  SAVE NUMBER OF CHARACTERS
   .     C1112 PLAYBSTOR      ENT  B7•0                              00760  12700 00000  RESTORE B-REGS
   .     C1113                ENT  B6•0                              00761  12600 00000
   .     C1114                ENT  B5•0                              00762  12500 00000
   .     C1115                RPL  Y+1•L(PLAYUP)                     00763  36010 00730
   .     C1116                EXIT                                   00764  61010 00730  NORMAL EXIT
   .     C1117 LAYUPLMT       EQUALS     1300
   .     C112C LAYUPSTOR      RESERVE    1310                        00765  00000 00000
   .     C1121 CHARNO         RESERVE    1                           01170  00000 00000
   .     C1122 PFRACSTOR      ENTRY                                  01171  61000 00000
   .     C1123                ENT  A•W(BETA)•ANOT                    01172  11530 02233  IF BETA GRTR 0,
   .     C1124                JP   PFRACB                            01173  61000 01223
   .     C1125                ENT  A•75                              01174  11000 00075
   .     C1126                STR  A•L(PBUF+B11                      01175  16011 02337
   .     C1127                BSK  B1•1290                           01176  71100 00201
   .     C113C                JP   $+2                               01177  61000 01201
   .     C1131                JP   PFRACERR                          01200  61000 01220
   .     C1132                ENT  B4•0                              01201  12400 00000
   .     C1133                ENT  B5•0                              01202  12500 00000
   .     C1134 PFRACA         ENT  Q•W(10FRACTION+B5)                01203  10035 02243  UNPACK FRACTION
   .     C1135                CL   A•                                01204  11000 00000
   .     C1136                LSH  AQ•6                              01205  07000 00006
   .     C1137                STR  A•L(PBUF+B11                      01206  16011 02337
   .     C114C                BSK  B1•1290                           01207  71100 00201
   .     C1141                JP   $+2                               01210  61000 01212
   .     C1142                JP   PFRACERR                          01211  61000 01220
   .     C1143                RPL  Y-1•W(BETA)•ANOT                  01212  37530 02233  STORE BETA DIGITS (K)
   .     C1144                JP   PFRACB                            01213  61000 01223  WHEN DONE, EXIT
   .     C1145                BSK  B4•4                              01214  71400 00004
   .     C1146                JP   PFRACA+1                          01215  61000 01204
   .     C1147                BSK  B5•1                              01216  71500 00001
   .     C115C                JP   PFRACA                            01217  61000 01203
   .     C1151 PFRACERR       ENT  A•W(PFRACERR1)                    01220  11030 01225
   .     C1152                RJP  PERRORR                           01221  65000 01256
   .     C1153                EXIT                                   01222  61010 01171
   .     C1154 PFRACB         RPL  Y+1•L(PFRACSTOR)                  01223  36010 01171
   .     C1155                EXIT                                   01224  61010 01171
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CARDS	LI ID	LABEL	TA	STATEMENT	LOC	F JKB Y	NOTES
.	C1156	PFRACERR1		00001 PFRACSTOR	01225	00001 01171	
.	C1157			COMMENT ROUTINES			TO SAVE AND RESTORE ALL REGISTERS
.	C116C	PSAVE		ENTRY	01226	61000 00000	
.	C1161			STR A•W(PASTOR1	01227	15030 01254	
.	C1162			STR 0•W1POSTOR1	01230	14030 01255	
.	C1163			STR B1•L(PRESTORE+11	01231	16110 01242	
.	C1164			STR B2•L1PRESTORE+21	01232	16210 01243	
.	C1165			STR B3•L(PRESTORE+31	01233	16310 01244	
.	C1166			STR B4•L(PRESTORE+41	01234	16410 01245	
.	C1167			STR B5•L(PRESTORE+51	01235	16510 01246	
.	C117C			STR B6•L1PRESTORE+61	01236	16610 01247	
.	C1171			STR B7•L(PRESTORE+71	01237	16710 01250	
.	C1172			EXIT	01240	61010 01226	
.	C1173	PRESTORE		ENTRY	01241	61000 00000	
.	C1174			ENT B1•0	01242	12100 00000	
.	C1175			ENT B2•0	01243	12200 00000	
.	C1176			ENT B3•0	01244	12300 00000	
.	C1177			ENT B4•0	01245	12400 00000	
.	C12CC			ENT B5•0	01246	12500 00000	
.	C1201			ENT B6•0	01247	12600 00000	
.	C12C2			ENT B7•0	01250	12700 00000	
.	C12C3			ENT A•W1PASTOR1	01251	11030 01254	
.	C1204			ENT 0•W(POSTOR1	01252	10030 01255	
.	C1205			EXIT	01253	61010 01241	
.	C12C6	PASTOR		0 0	01254	00000 00000	
.	C1207	POSTOR		0 0	01256	00000 00000	
.	0121C			COMMENT ROUTINE			TO PRINT AND TYPE ERROR
.	C1211			COMMENT CODE			AND LOCATION
.	C1212			COMMENT			
.	C1213	PERRORR		ENTRY	01256	61000 00000	
.	C1214			STR A•L1PERRORR21	01257	15010 01266	LOC
.	C1215			RSH A•150	01260	02000 00017	
.	C1216			SEL SET•6060	01261	50000 06060	
.	C1217			STR A•W1PERROR11	01262	15030 01317	
.	C122C			RJP P1MAGE	01263	65000 00365	DEFINE NEW BUFFER
.	C1221			0 PERROR4	01264	00000 01314	
.	C1222			NO-OP	01265	12000 00000	
.	C1223	PERRORR2		ENT Q•L100)	01266	10010 00000	GET LOC OF CALLER
.	C1224			CL A•	01267	11000 00000	
.	C1225			LSH Q•150	01270	05000 00017	
.	C1226			LSH A•3	01271	06000 00003	
.	C1227			LSH AQ•3	01272	07000 00003	
.	C123C			AOO 0•0•0ZERO	01273	26400 00000	
.	C1231			JP $-3	01274	61000 01271	
.	C1232			SEL SET•W(S1XTIES1	01275	50030 02231	
.	01233			STR A•W(PERROR15)	01276	15030 01323	
.	C1234			RJP PSCR1B	01277	65000 00501	PRINT
.	01235			1 0	01300	00001 00000	
.	C1236			NO-OP	01301	12000 00000	
.	01237			RJP PLAYUP	01302	65000 00730	SPREAD OUT MESSAGE
.	C1240			U-TAG PERROR4•80	01303	01314 00010	
.	01241			ENT A•0403	01304	11000 00403	ADD CR AND LF

CAROS	LI IO LAREL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C1242	STR A•W(LAYUPSTOR+400)	01306	15030 01035	
.	C1243	NO-OP	01306	12000 00000	
.	01244	JP $-1•KEYOUT•ACTIVEOUT	01307	63100 01306	
.	C1245	OUT KEYOUT•W(PERROR9)	01310	74130 01326	
.	C1246	NO-OP	01311	12000 00000	
.	01247	JP $-1•KEYOUT•ACTIVEOUT	01312	63100 01311	
.	01250	EXIT	01313	61010 01256	
.	C1251 PERROR4	FO 3•ERROR TYPE	01314	12272 72427	
			01315	05313 62512	
			01316	05050 50505	
.	C1252 PERROR1	O O	01317	00000 00000	
.	C1253	FO 3• AT LOCATION	01320	05050 53105	
			01321	21241 00631	
			01322	16242 30505	
.	C1254 PERROR15	O O	01323	00000 00000	
.	C1255	77777 00000	01324	77777 00000	
.	C1256 PERROR8	U-TAG PERROR4+260•PERROR4	01325	01346 01314	
.	C1257 PERROR9	U-TAG LAYUPSTOR+360•LAYUPSTOR	01326	01031 00765	
.	C1260 B1NOEC1NT	JP O	01327	61000 00000	EXIT ENTRY
.	C1261	STR B1•U(B1NOEC1NT31	01330	16120 01357	SAVE B REGISTERS
.	C1262	STR B2•L(B1NOEC1NT31	01331	16210 01357	
.	01263	STR B7•L(B1NOEC1NT41	01332	16710 01355	
.	01264	CL B2	01333	12200 00000	1NITIALIZE B REGS FOR COUNT
.	C1265	ENT B1•1	01334	12100 00001	
.	01266	STR B1•W(SIGN1	01335	16130 02236	STORE 1 (B1) IN SIGN AS NEG SI GN
.	01267	ENT Q•W(1NTEGER1•QNEG	01336	10330 02234	TEST IF NUMBER(TO BE CONV) IS NEG
.	01270	RPL Y-1•W(SIGN1•SKIP	01337	37130 02236	POS RESET SIGN TO ZERO-GO TO M AIN
.	01271	CP Q	01340	14000 00000	NEG LEAVE SIGN-COMPLEMENT NUMB ER
.	01272 B1NOEC1NT1	CL W(1O1NTEGER+B11	01341	16031 02241	MAIN LOOP-INITIALLY CLEAR OUTP UT
.	01273 B1NOEC1NT2	CL A	01342	11000 00000	CLEAR A FOR DIVIDE
.	C1274	DIV 12	01343	23000 00012	NEC DEC DIGIT REMAINS IN A
.	01275	ADD A•60	01344	20000 00060	1NCORPORATE FLDATA BITS
.	01276	RPT B2	01345	70002 00000	VARIABLE SHIFT TO INCORP FLDAT A
.	C1277	LSH A•6	01346	06000 00006	DIGIT IN RT. JUSTIFIED OUTPUT
.	01300	RSE SET•W(1O1NTEGER+B11	01347	54031 02241	ADD IN NEW 6-BIT CODE
.	01301	BSK B2•4	01350	71200 00004	OUTPUT WORD FILLED YET (5 CODE S)
.	C1302	JP B1NOEC1NT2	01351	61000 01342	NO-GET ANOTHER CODE
.	C1303	BJP B1•B1NOEC1NT1	01352	72100 01341	YES-OUTPUT COMPLETED-IF NO DO NEXT
.	01304	ENT B1•U(B1NOEC1NT31	01353	12120 01357	YES-RESTORE B REGS
.	C1305	ENT B2•L(B1NOEC1NT31	01354	12210 01357	
.	C1306 B1NOEC1NT4	ENT B7•0	01355	12700 00000	
.	01307	JP B1NOEC1NT	01356	61000 01327	AND EXIT
.	01310 B1NOEC1NT3	O O	01357	00000 00000	SAVE B REGISTERS HERE
.	01311 B1NOCTFLO	JP O	01360	61000 00000	ENTRY EXIT

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CARDS    LI IC LABEL      TA STATEMENT                                LOC    F UKB Y      NOTES

.     C1312               STR  B7*L(B1NOCTFLD3)                      01361  16710 01374
.     01313               CL   B7                                    01362  12700 00000  CLEAR B7 FOR COUNT
.     C1314               ENT  Q*W(1INTEGER1                         01363  10030 02234  ENTER INPUT WORD
.     01315 B1NDCTFL01    CL   A                                     01364  11000 00000  MAIN LOOP SET WORD INITIALLY T
                                                                                         O ZER
.     01316 B1NDCTFL02    LSH  A*3                                   01365  06000 00003  ALLOW ROOM FOR FLOATA BITS
.     C1317               LSH  AQ*3                                  01366  07000 00003  INSERT 3BINARY BITS1 1OCTAL DIG
                                                                                         I.T1
.     C1320               ADD  A*60*ANEG                             01367  20700 00060  INSERT FLOATA CODE TEST IF WOR
                                                                                         D FIL
.     C1321               JP   B1NOCTFLD2                            01370  61000 01365  NOT FILLED INSERT NEXT DIGIT
.     01322               STR  A*W(1O1NTEGER+B71                     01371  15037 02241  FILLED-STORE OUTPUT
.     C1323               BSK  B7*1                                  01372  71700 00001  ALL OUTPUT COMPLETE
.     C1324               JP   B1NOCTFLD1                            01373  61000 01364  NO- MAKE 2ND WORD
.     C1325 B1NOCTFLD3    ENT  B7*0                                  01374  12700 00000
.     01326               JP   B1NOCTFLD                             01375  61000 01360  AND EXIT
.     C1327 B1NDECFRA     ENTRY                                      01376  61000 00000
.     01330               CL   B7                                    01377  12700 00000  SET BREG
.     C1331               ENT  Q*1                                   01400  10000 00001  FIND IF NO IS + OR -,
.     01332               ENT  A*W(FRACT1ON1*APOS                    01401  11530 02235  SET SIGN APPROPRIATELY
.     01333               STR  A*A*ANOT                              01402  15540 00000  AND SET NUMBER POSITIVE
.     C1334               ENT  Q*0                                   01403  10000 00000
.     C1335               STR  Q*W1S1GN1                             01404  14030 02236
.     01336               RSH  AQ*290                                01405  03000 00035  INITIALIZE
.     C1337 B1NDECFRA1    ENT  A*0                                   01406  11000 00000  SET OUTPUT WORD TO ZERO
.     01340 B1NDECFRA2    LSH  A*6                                   01407  06000 00006  RESET OUTPUT WORD FOR NEXT COD
                                                                                         E
.     01341               STR  A*W(1OFRACT1ON+B7)                    01410  15037 02243  AND STORE
.     01342               RSH  AQ*1                                  01411  03000 00001  SET Q FOR MUL OPERATION
.     01343               MUL  24                                    01412  22000 00024  PRODUCT AT B29
.     C1344               SEL  SET*60                                01413  50000 00060  INSERT FIELOATA BITS
.     01345               RSE  SET*W(1OFRACT1ON+B7)*ANEG             01414  54737 02243  INSERT NEW CODE,WORD FILLED
.     01346               JP   B1NDECFRA2                            01415  61000 01407  NO-KEEP FILLING SAME WORD
.     D1347               BSK  B7*1                                  01416  71700 00001  YES-ARE BOTH WORDS FILLED
.     C1350               JP   B1NDECFRA1                            01417  61000 01406  NO-GO SECOND WORD
.     01351               EXIT                                       01420  61010 01376
.     C1352 COFF1X        ENTRY                                      01421  61000 00000
.     D1353               STR  B7*L1COFXSTOR1                        01422  16710 01465
.     C1354               STR  B2*L(COFFTEM11                        01423  16210 01463
.     01355               STR  B3*L1COFFTEM21                        01424  16310 01454
.     01356               CL   W1FXCODE1                             01425  16030 02230  INITIALIZATION
.     01357               CL   W(S1GN1                               01426  16030 02236
.     C1360               ENT  B2*L1COFFIX1                          01427  12210 01421  B2 CONTAINS LOC OF ARG + GAMMA

.     C1361               ENT  B3*U(B21                              01430  12322 00000
.     D1362               ENT  A*W(B31*ANEG                          01431  11733 00000  ARGUMENT UNTO A TEST + OR -
.     C1363               JP   COFF1                                 01432  61000 01435  + CONTINUE
.     01364               STR  A*W1FXCODE1                           01433  15030 02230
.     D1365               CP   A*                                    01434  15040 00000  -
.     D1366 COFF1         CL   Q*                                    01435  10000 00000
.     C1367               ENT  B2*L1B21                              01436  12212 00000
.     D1370               RSH  AQ*B2                                 01437  03002 00000
.     D1371               STR  A*W(1NTEGER1                          01440  15030 02234
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CARDS   L1 ID LABEL        TA STATEMENT                        LOC    F JKB Y      NOTES

  .     01372                 LSH  Q•290                       01441  05000 00035
  .     01373                 STR  Q•W1FRACTION1               01442  14030 02235
  .     01374                 RJP  BINDECINT                   01443  65000 01327  CONVERT BIN INT TO FLOTA
  .     01375                 RJP  BINDECFRA                   01444  65000 01376  CONVERT BIN FRAC TO FLOTA
  .     01376                 RJP  COFRNO                      01445  65000 01516
  .     01377                 RJP  SUPZRO                      01446  65000 01457
  .     01400                 U-TAG      IDINTEGER•2           01447  02241 00002
  .     01401                 ENT  A•W1FXCODE1•AZERO           01450  11430 02230
  .     01402                 STR  A•W1SIGN1                   01451  15030 02236
  .     01403                 RPL  Y+1•L(COFFIX1               01452  36010 01421
  .     01404 COFFTEM1        ENT  B2•0                        01453  12200 00000
  .     01405 COFFTEM2        ENT  B3•0                        01454  12300 00000
  .     01406 COFXSTOR        ENT  B7•0                        01455  12700 00000
  .     01407                 EXIT                             01456  61010 01421
  .     01410 SUPZRO          ENTRY                            01457  61000 00000
  .     01411                 STR  B6•L(SUPBSTOR1              01460  16610 01513
  .     01412                 STR  B7•L1SUPBSTOR+11            01461  16710 01514
  .     01413                 ENT  B7•L(SUPZRO1                01462  12710 01457
  .     01414                 RPL  Y+1•L(SUPZRO1               01463  36010 01457
  .     01415                 ENT  B6•L1B71                    01464  12617 00000  NO OF WRDS
  .     01416                 STR  B6•L(SUPZRO31               01465  16610 01501
  .     01417                 ENT  B6•1                        01466  12600 00001
  .     01420                 ENT  B7•U1B71                    01467  12727 00000  ADDRESS
  .     01421 SUPZRO1         ENT  Q•W(B71                     01470  10037 00000  BRING NEXT (1ST1 WORD
  .     01422 SUPZRO2         CL   A•                          01471  11000 00000
  .     01423                 LSH  AQ•6                        01472  07000 00006  MOVE 1 DIGIT INTO A
  .     01424                 COM  A•61•YMORE                  01473  04700 00061  TEST FOR EQUAL TO 60
  .     01425                 JP   SUPZRO4                     01474  61000 01506  IF NOT, JUMP TO CLEAN-UP
  .     01426                 ADD  Q•0•QZERO                   01475  26400 00000  IF SO, TEST FOR WORD EXHAUSTED
  .     01427                 JP   SUPZRO2                     01476  61000 01471  IF MORE DIGITS, RETURN TO TEST
  .     01430                 CL   W(B71                       01477  16037 00000
  .     01431                 ENT  B7•1+B7                     01500  12707 00001  IF NOT,BUMP ADDRESS OF WORD
  .     01432 SUPZRO3         BSK  B6•NIL                      01501  71600 00000  TEST FOR ALL WORDS DONE
  .     01433                 JP   SUPZRO1                     01502  61000 01470  RETURN FOR NEXT WORD
  .     01434                 ENT  A•60                        01503  11000 00060  IF WORDS ALL ZERO, PRINT 1
  .     01435                 ENT  B7•B7-1                     01504  12707 77776
  .     01436                 JP   SUPZRO5                     01505  61000 01512
  .     01437 SUPZRO4         ADD  Q•0•QNOT                    01506  26500 00000  WHEN FIND NON-ZERO
  .     01440                 JP   SUPZRO5                     01507  61000 01512
  .     01441                 LSH  AQ•6                        01510  07000 00006  MOVE REST OF WORD TO A
  .     01442                 JP   SUPZRO4                     01511  61000 01506
  .     01443 SUPZRO5         STR  A•W1B71                     01512  15037 00000  STORE BACK IN PROPER SLOT
  .     01444 SUPBSTOR        ENT  B6•NIL                      01513  12600 00000
  .     01445                 ENT  B7•0                        01514  12700 00000
  .     01446                 EXIT                             01515  61010 01457
  .     01447 COFRNO          ENTRY                            01516  61000 00000
  .     01450                 ENT  A•90                        01517  11000 00011
  .     01451                 SUB  A•W(BETA1                   01520  21030 02233
  .     01452                 ENT  B7•A                        01521  12770 00000  PUT 9-BETA IN B7
  .     01453                 ENT  Q•W1IDFRACTION+1)           01522  10030 02244  BRING FLOATA FRACTION TO AQ
  .     01454                 ENT  A•W1IDFRACTION1             01523  11030 02243
  .     01455                 CL   W1IDFRACTION1               01524  16030 02243
  .     01456                 CL   W1IDFRACTION+11             01525  16030 02244
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CAROS    LI ID LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES

   .     01457            SEL  CL•W(HIBIT)                           01526  52030 02222
   .     01460 COFRNO1    BJP  B7•COFRNO2                            01527  72700 01531  SUBTRACT 1 FROM B7
   .     01461            JP   COFRNO3                               01530  61000 01533  WHEN B7 IS 0, STOP SHIFTING
   .     01462 COFRNO2    RSH  AQ•6                                  01531  03000 00006  SHIFT OFF 1 OIGIT
   .     01463            JP   COFRNO1                               01532  61000 01527  RETURN TO TEST B7
   .     01464 COFRNO3    LSH  AQ•540                                01533  07000 00066  PUT BETA+1TH OIGIT IN A1-6
   .     01465            COM  A•W(SIXTYFIVE1•YMORE                  01534  04730 02224
   .     01466            JP   COFRNO5                               01535  61000 01545  IF MORE THAN 4, GO TO AOO I
   .     01467            SEL  CL•W(M6L1                             01536  52030 02225  IF LESS THAN 5, CLEAR IT
   .     01470 COFRNO4    LSH  AQ•1•ANEG                             01537  07700 00001  LEFT JUSTIFY FRACTION
   .     01471            JP   COFRNO4                               01540  61000 01537
   .     01472            RSH  AQ•1                                  01541  03000 00001  PUT HIGH ORDER BIT BACK ON
   .     01473 COFRNO41   STR  A•W(IOFRACTION1                       01542  15030 02243  STORE AWAY
   .     01474            STR  Q•W(IOFRACTION+1)                     01543  14030 02244
   .     01475            JP   COFRNOB1                              01544  61000 01604
   .     01476 COFRNO5    SEL  CL•W(M6L1                             01545  52030 02225  IF MUST AOO I, CLEAR EXTRA OIG
                                                                                         IT
   .     01477            LSH  AQ•540                                01546  07000 00066  SHIFT LOW-ORDER OIGIT TO TOP O
                                                                                         F A
   .     01500            COM  A•W(SEVENTYONE1•YMORE                 01547  04730 02226  TEST EQUAL TO 71
   .     01501            JP   COFRNO5I•ANOT                         01550  60500 01555  IF SO, RETURN TO TEST NEXT OIG
                                                                                         LT
   .     01502            JP   COFRNO6•AZERO                         01551  60400 01565  IF NOT, TEST FOR FRACTION ALL
                                                                                         0
   .     01503            ADO  A•WIBIT51                             01552  20030 02227  IF NOT, AOO I TO OIGIT
   .     01504            LSH  AQ•5                                  01553  07000 00006  RIGHT JUSTIFY FRACTION
   .     01505            JP   COFRNO4                               01554  61000 01537
   .     01506 COFRNO51   JP   COFRNO5•ANEG                          01555  60700 01545  OIGIT MAY HAVE HAD HIBIT
   .     01507            SEL  SET•W(HIBIT)                          01556  50030 02222  CLEARED, SO RESTORE AND
   .     01510            COM  A•W(SEVENTYONE1•YMORE                 01557  04730 02226
   .     01511            JP   COFRNO5                               01560  61000 01545
   .     01512            AOO  A•WIBIT51                             01561  20030 02227
   .     01513 COFRNO52   LSH  AQ•6•ANEG                             01562  07700 00006
   .     01514            JP   COFRNO52                              01563  61000 01562
   .     01515            JP   COFRNO41                              01564  61000 01542
   .     01516 COFRNO6    ENT  Q•W(IOINTEGER+1)                      01565  10030 02242
   .     01517            ENT  A•W(IOINTEGER1                        01566  11030 02241
   .     01520            JP   COFRNO7+1                             01567  61000 01571
   .     01521 COFRNO7    SEL  CL•W(M6L1                             01570  52030 02225
   .     01522            LSH  AQ•540                                01571  07000 00066
   .     01523            COM  A•W(SEVENTYONE1•YMORE                 01572  04730 02226
   .     01524            JP   COFRNO7                               01573  61000 01570
   .     01525            ADO  A•W(BIT5)                             01574  20030 02227
   .     01526 COFRNO8    LSH  AQ•6•ANEG                             01575  07700 00006
   .     01527            JP   COFRNOB                               01576  61000 01575
   .     01530            SEL  SET•W(SIXTIES1                        01577  50030 02231
   .     01531            STR  A•W(IOINTEGER1                        01600  15030 02241
   .     01532            STR  Q•A                                   01601  14040 00000
   .     01533            SEL  SET•W(SIXTIES1                        01602  50030 02231
   .     01534            STR  A•W(IOINTEGER+11                      01603  15030 02242
   .     01535 COFRNOB1   ENT  B7•W(BETA1                            01604  12730 02233
   .     01536            BJP  B7•COFRNO9                            01605  72700 01607
   .     01537            JP   COFRNO11                              01606  61000 01615
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CARDS	L1 ID	LABEL	TA	STATEMENT	LOC	F JKB Y	NOTES
.	01540	COFRND9		ENT A*W(SIXTY)	01607	11030 02223	
.	01541			CL Q*	01610	10000 00000	
.	01542			BJP B7*COFRND10	01611	72700 01613	
.	01543			JP COFRND11	01612	61000 01616	
.	01544	COFRND10		LSH AQ*540	01613	07000 00066	
.	01545			SEL SET*W(SIXTY)	01614	50030 02223	
.	01546			BJP B7*COFRND10	01615	72700 01613	
.	01547	COFRND11		RSE SET*W(IOFRACTION)	01616	54030 02243	
.	01550			STR Q*A	01617	14040 00000	
.	01551			RSE SET*W(IOFRACTION+1)	01620	54030 02244	
.	01552			EXIT	01621	61010 01516	
.	01553			COMMENT			$
.	01554			CALL FLTPT			
.	01555			COMMENT ROUTINE			TO CONVERT A FLOATING PT NUMBE R AND
.	01556			COMMENT PLACE			IT IN THE PRINT BUFFER.
.	01557			COMMENT CALLING			SEQUENCE
.	01560			COMMENT RJP			PFLOAT
.	01561			COMMENT INDEX*Y			
.	01562			COMMENT NUMCHARFRAC*COL			
.	01563			COMMENT ERROR			
.	01564			COMMENT NORMAL			$
.	01565	PFLOAT		ENTRY	01622	61000 00000	
.	01566			RJP PENTRY	01623	65000 00706	
.	01567			JP PFLTERR	01624	61000 01704	GET ADDRESS OF T,Y
.	01570			STR B6*U(PFLTA)	01625	16620 01631	
.	01571			ENT A*U(1+B7)	01626	11027 00001	GET BETA (K)
.	01572			STR A*W(BETA)	01627	15030 02233	
.	01573			RJP COTFLT	01630	65000 01713	CONVERT,SUPPRESS AND ROUND
.	01574	PFLTA		O O	01631	00000 00000	
.	01575			JP PFLTERRA	01632	61000 01705	
.	01576			ENT B1*L(PCOLUMN)	01633	12110 00666	
.	01577			ENT A*W(SIGN)*AZERO	01634	11430 02236	
.	01600			ENT A*41	01635	11000 00041	
.	01601			STR A*L(PBUF+B11	01636	15011 02337	
.	01602			BSK B1*1290	01637	71100 00201	
.	01603			JP $+2	01640	61000 01642	
.	01604			JP PFLTERR	01641	61000 01704	
.	01605			ENT A*W(IOINTEGER+11	01642	11030 02242	STORE 1 INTEGER DIGIT
.	01606			STR A*L(PBUF+B11	01643	15011 02337	
.	01607			BSK B1*1290	01644	71100 00201	
.	01610			JP $+2	01645	61000 01647	
.	01611			JP PFLTERR	01646	61000 01704	
.	01612			RJP PFRACSTOR	01647	65000 01171	STORE FRACTION
.	01613			JP PFLTERR	01650	61000 01704	
.	01614			ENT A*W(IOEXPONENT)*ANOT	01651	11530 02245	
.	01615			JP PFLTB-1	01652	61000 01677	
.	01616			ENT A*W(EXPSIGN)*AZERO	01653	11430 02246	
.	01617			ENT A*41*SKIP	01654	11100 00041	
.	01620			ENT A*42	01655	11000 00042	
.	01621			STR A*L(PBUF+B11	01656	15011 02337	
.	01622			BSK B1*1290	01657	71100 00201	
.	01623			JP $+2	01660	61000 01662	

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CAROS    L1 TO LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES
   .     01624            JP   PFLTERR                               01661  61000 01704
   .     01625            ENT  Q•W(IOEXPONENT)                       01662  10030 02245
   .     01626            CL   A•                                    01663  11000 00000
   .     01627            LSH  AQ•240                                01664  07000 00030
   .     01630            STR  A•L(PBUF+B1)                          01665  15011 02337
   .     01631            BSK  B1•1290                               01666  71100 00201
   .     01632            JP   $+2                                   01667  61000 01671
   .     01633            JP   PFLTERR                               01670  61000 01704
   .     01634            CL   A•                                    01671  11000 00000
   .     01635            LSH  AQ•6                                  01672  07000 00006
   .     01636            STR  A•L(PBUF+B1)                          01673  15011 02337
   .     01637            BSK  B1•1290                               01674  71100 00201
   .     01640            JP   $+2                                   01675  61000 01677
   .     01641            JP   PFLTERR                               01676  61000 01704
   .     01642            ENT  A•3                                   01677  11000 00003
   .     01643 PFLTB      RPL  A+Y•L(PFLOAT)                         01700  24010 01622
   .     01644            STR  B1•W(PCOLUMN)                         01701  16130 00666
   .     01645            RJP  PRESTORE                              01702  65000 01241
   .     01646            EXIT                                       01703  61010 01622
   .     01647 PFLTERR    ENT  A•PFLTERR1•SKIP                       01704  11100 01711
   .     01650 PFLTERRA   ENT  A•PFLTERR4                            01705  11000 01712
   .     01651            RJP  PERRORR                               01706  65000 01255
   .     01652            ENT  A•2                                   01707  11000 00002
   .     01653            JP   PFLTB                                 01710  61000 01700
   .     01654 PFLTERR1   00001      PFLOAT                          01711  00001 01622
   .     01655 PFLTERR4   00004      PFLOAT                          01712  00004 01622
   .     01656            COMMENT    SUBROUTINE                                        TO CONVERT INTERNAL FLOATING P
                                                                                       T
   .     01657            COMMENT    NUMBER                                            TO OUTPUT EXPONENTIAL FORM
   .     01660 COTFLT     ENTRY                                      01713  61000 00000
   .     01661            STR  B4•L(COTXT)                           01714  16410 02052
   .     01662            STR  B5•L(COTXT+1)                         01715  16510 02053
   .     01663            STR  B6•L(COTXT+2)                         01716  16610 02054
   .     01664            STR  B1•L(COTXT+3)                         01717  16110 02055
   .     01665            STR  B7•L(COTXT+4)                         01720  16710 02056
   .     01666            ENT  B1•1                                  01721  12100 00001
   .     01667            ENT  B7•L(COTFLT)                          01722  12710 01713
   .     01670            ENT  B7•U(B7)                              01723  12727 00000  GET ADDRESS OF FLT PT NO.
   .     01671            RPL  Y+1•L(COTFLT)                         01724  36010 01713  ADJUST EXIT OT ERROR RETURN
   .     01672            CL   W(IOEXPONENT)                         01725  16030 02245
   .     01673            CL   W(SINTEMP)                            01726  16030 02133
   .     01674            CL   Q•                                    01727  10000 00000
   .     01675            ENT  A•W(B7+1)•ANOT                        01730  11537 00001  IF NUMBER 0, EXIT
   .     01676            JP   COT7                                  01731  61000 02021
   .     01677            ENT  A•W(B7+1)•APOS                        01732  11637 00001  TEST SIGN OF FRACTION
   .     01700            STR  A•CPW(FPFRACTION)•SKIP                01733  15170 02240  MAKE FRACTION LOOK POS
   .     01701            STR  A•W(FPFRACTION)•SKIP                  01734  15130 02240
   .     01702            STR  A•W(SINTEMP)                          01735  15030 02133  STORE MINUS INDICATION
   .     01703            ENT  A•LX(B7)                              01736  11057 00000
   .     01704            STR  A•L(EXPONENT)•ANEG                    01737  15710 02237  TEST SIGN OF EXP
   .     01705            JP   COTNEG1                               01740  61000 02060  + IMPLIES NEG EXPONENT
   .     01706            CL   W(EXPSIGN)                            01741  16030 02246  STORE + SIGN OF EXP
   .     01707 COT1       ENT  A•L(EXPONENT)                         01742  11010 02237
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CAROS	LI IC	LABEL	TA	STATEMENT	LOC	F JKB Y	NOTES
.	01710		COM	A•L(TEN12)•YLESS	01748	04610 02160	
.	01711		JP	COT2	01744	61000 01763	NO. IS LESS THAN 10 TO 10TH
.	01712		ENT	Q•X77777	01745	10040 77777	
.	01713		COM	MASK•L(TEN12)•AZERO	01746	43410 02160	
.	01714		JP	COT11	01747	61000 01753	NO. IS MORE THAN 10 TO 10TH
.	01715		ENT	A•W(FPFRACTION)	01750	11030 02240	IF EXP =, TEST FRACTIONS
.	01716		COM	A•W(TEN12+11•YLESS	01751	04830 02161	
.	01717		JP	COT2	01752	61000 01763	NO. IS LESS 10 TO 10TH
.	01720	COT11	ENT	B4•EXPONENT	01753	12400 02237	
.	01721		ENT	B5•MTEN12	01754	12500 02212	
.	01722		ENT	B6•EXPONENT	01755	12600 02237	
.	01723		ENT	B7•02	01756	12700 00002	
.	01724		RJP	FLTPT	01757	65000 02541	MULTIPLY BY 10 TO -10TH
.	01725		ENT	A•10D	01760	11000 00012	
.	01726		RPL	A+Y•W(IOEXPONENT)	01761	24030 02245	ADD 10 TO OUTPUT EXP
.	01727		JP	COT1	01762	61000 01742	RETURN TO TEST NEW NO.
.	01730	COT2	ENT	B7•90	01763	12700 00011	
.	01731		ENT	B6•180	01764	12600 00022	
.	01732		ENT	Q•X77777	01765	10040 77777	
.	01733	COT3	ENT	A•L(EXPONENT)	01766	11010 02237	
.	01734		COM	A•L(TEN1+B61•YLESS	01767	04616 02136	
.	01735		JP	COT4	01770	61000 01776	NO.LESS THAN THAT PWR OF 10
.	01736		COM	MASK•L(TEN1+B61•AZERO	01771	43416 02136	
.	01737		JP	COT5	01772	61000 02001	IF GRTR, GO TO MULTIPLY
.	01740		ENT	A•W(FPFRACTION)	01773	11030 02240	IF EXP =, TEST FRACTIONS
.	01741		COM	A•W(TEN1+B6+11•YMORE	01774	04736 02137	
.	01742		JP	COT5	01775	61000 02001	
.	01743	COT4	ENT	B6•B6-2	01776	12606 77775	IF NO.= OR LESS, LOOK AT
.	01744		BJP	B7•COT3	01777	72700 01766	NEXT LOWER PWR OF 10
.	01745		JP	COT6	02000	61000 02010	NO. NEED NOT BE REDUCED
.	01746	COT5	ENT	A•1+B7	02001	11007 00001	
.	01747		RPL	A+Y•W(IOEXPONENT)	02002	24030 02245	
.	01750		ENT	B4•EXPONENT	02003	12400 02237	
.	01751		ENT	B5•MTEN1+B6	02004	12506 02170	
.	01752		ENT	B6•EXPONENT	02005	12600 02237	
.	01753		ENT	B7•02	02006	12700 00002	
.	01754		RJP	FLTPT	02007	65000 02541	DIVIDE BY SM PWR OF 10
.	01755	COT6	ENT	Q•W(FPFRACTION)	02010	10030 02240	COMMON PATH AFTER MULTIPLYING
.	01756		LSH	Q•2	02011	05000 00002	
.	01757		ENT	A•L(EXPONENT)	02012	11010 02237	
.	01760		SUB	A•40000•ANOT	02013	21500 40000	
.	01761		JP	COT7-1	02014	61000 02020	
.	01762		CL	A•	02015	11000 00000	
.	01763		ENT	B7•L(EXPONENT)	02016	12710 02237	
.	01764		LSH	AQ•B7-40000	02017	07007 37777	SHIFT INTEGER PORTION TO A
.	01765		LSH	Q•290	02020	05000 00035	
.	01766	COT7	STR	A•W(INTEGER)	02021	15030 02234	
.	01767		STR	Q•W(FRACTION)	02022	14030 02235	
.	01770		RJP	BINOECINT	02023	66000 01327	
.	01771		RJP	BINOECFRA	02024	65000 01376	
.	01772		RJP	COFRNO	02025	65000 01516	TRUNCATE BETA+1 AND ROUND
.	01773		RJP	SUPZRO	02026	65000 01457	SUPPRESS LEADING ZEROS

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CAROS    LI ID LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES

.        C1774              U-TAG     I01NTEGER•2                    02027  02241 00002
.        01775              ENT   A•W(101NTEGER+1)                   02030  11030 02242
.        01776              SEL   CP•06160•AZERO                      02031  51400 06160  TEST FOR NUMBER ROUNDED TO 10
.        01777              JP    $+4                                 02032  61000 02036
.        C2000              PUT   61•W(101NTEGER+1)                   02033  10000 00061  IF SO JAM IN A 1
                                                                      02034  14030 02242
.        C2001              RPL   Y+1•W(10EXPONENT)                   02035  36030 02245  AND BUMP EXPONENT BY 1
.        C2002              PUT   W(SINTEMP)•W(SIGN)                  02036  10030 02133
                                                                      02037  14030 02236
.        C2003              ENT   Q•W(10EXPONENT)                     02040  10030 02245
.        C2004              CL    A•                                  02041  11000 00000
.        C2005              COM   Q•51•YMORE                          02042  04300 00051  TEST FOR EXP GRTR THAN 40
.        C2006              JP    COTXT                               02043  61000 02052  IF SO, ERROR
.        C2007              DIV   12                                  02044  23000 00012  CONVERT TO DECIMAL
.        C201C              LSH   A•240                               02045  06000 00030
.        C2011              LSH   AQ•360•AZERO                        02046  07400 00044
.        C2012              SEL   SET•W(SIXTIES)                      02047  50030 02231  CONVERT TO FLOATA
.        02013              STR   A•W(10EXPONENT)                     02050  15030 02245  STORE IN OUTPUT
.        C2014              RPL   Y+1•L(1COTFLT)                      02051  36010 01713  AOJUST EXIT TO NORMAL RETURN

.        C2015 COTXT        ENT   B4•NIL                              02052  12400 00000  EXIT
.        C2016              ENT   B5•NIL                              02053  12500 00000
.        C2017              ENT   B6•NIL                              02054  12600 00000
.        C2020              ENT   B1•NIL                              02055  12100 00000
.        C2021              ENT   B7•0                                02056  12700 00000
.        02022              EXIT                                      02057  61010 01713
.        C2023              COMMENT   THIS                                               BRANCH FOR NEGATIVE EXPONENTS
.        02024 COTNEG1      STR   A•W(1EXPSIGN)                       02060  15030 02246
.        C2025              ENT   A•L(EXPONENT)                       02061  11010 02237
.        02026              COM   A•L(MTEN12)•YLESS                   02062  04410 02212
.        C2027              JP    COTNEG11                            02063  61000 02072  NO LESS THAN 10 TO -10TH
.        02030              ENT   Q•X77777                            02064  10040 77777
.        C2031              COM   MASK•L(MTEN12)•AZERO                02065  43410 02212
.        C2032              JP    COTNEG2                             02066  61000 02102  NO GRTR THAN 10 TO -10TH
.        C2033              ENT   A•W(FPFRACTION)                     02067  11030 02240
.        C2034              COM   A•W(MTEN12+1)•YMORE                 02070  04730 02213
.        C2035              JP    COTNEG2                             02071  61000 02102  NO GRTR THAN 10 TO -10TH
.        02036 COTNEG11     ENT   B4•EXPONENT                         02072  12400 02237
.        C2037              ENT   B5•TEN12                            02073  12500 02160
.        02040              ENT   B6•EXPONENT                         02074  12600 02237
.        C2041              ENT   B7•02                               02075  12700 00002
.        C2042              RJP   FLTPT                               02076  65000 02541  MULTIPLY BY 10 TO 10TH
.        C2043              ENT   A•100                               02077  11000 00012  ADD 10 TO OUTPUT EXPONENT
.        02044              RPL   A+Y•W(10EXPONENT)                   02100  24030 02245
.        C2045              JP    COTNEG1+1                           02101  61000 02061  RETURN TO RETEST NO.
.        02046 COTNEG2      ENT   B7•90                               02102  12700 00011  WHEN NO = OR GRTR THAN
.        02047              ENT   B6•180                              02103  12600 00022  10 TO -10TH, LOOK FOR UNITS

.        C205C              ENT   Q•X77777                            02104  10040 77777  PWR OF 10 TO MULTIPLY BY
.        02051 COTNEG3      ENT   A•L(EXPONENT)                       02105  11010 02237
.        02052              COM   A•L(MTEN1+B6)•YLESS                 02106  04616 02170
.        02053              JP    COTNEG5                             02107  61000 02123
.        C2054              COM   MASK•L(MTEN1+B6)•AZERO              02110  43616 02170
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CARDS	LI IC	LABEL	TA	STATEMENT	LOC	F JKB Y	NOTES
.	02055		JP	COTNEG4	02111	61000 02115	
.	02056		ENT	A*W(FPFRACTION1	02112	11030 02240	
.	02057		COM	A*W(MTEN1+B6+11*YLESS	02113	04636 02171	
.	02060		JP	COTNEG5	02114	61000 02123	
.	02061	COTNEG4	ENT	B6*B6-2	02115	12606 77775	
.	02062		BJP	B7*COTNEG3	02116	72700 02105	
.	02063		ENT	B4*EXPONENT	02117	12400 02237	
.	02064		ENT	B5*TEN1	02120	12500 02136	
.	02065		RPL	Y+1*W(10EXPONENT)	02121	36030 02245	
.	02066		JP	COTNEG5+4	02122	61000 02127	
.	02067	COTNEG5	ENT	A*B7+2	02123	11007 00002	
.	02070		RPL	A+Y*W(10EXPONENT)	02124	24030 02245	
.	02071		ENT	B4*EXPONENT	02125	12400 02237	
.	02072		ENT	B5*TEN1+B6+2	02126	12506 02140	
.	02073		ENT	B6*EXPONENT	02127	12600 02237	
.	02074		ENT	B7*02	02130	12700 00002	
.	02075		RJP	FLTPT	02131	65000 02541	MULTIPLY BY LARGER PWR OF 10
.	02076		JP	COT6	02132	61000 02010	
.	02077	SINTEMP	0	0	02133	00000 00000	
.	02100	TEN	0	37775	02134	00000 37775	
.	02101		14631	46315	02135	14631 46315	
.	02102	TEN1	0	40004	02136	00000 40004	
.	02103		12000	0	02137	12000 00000	
.	02104	TEN2	0	40007	02140	00000 40007	
.	02105		14400	0	02141	14400 00000	
.	02106	TEN3	0	40012	02142	00000 40012	
.	02107		17500	0	02143	17500 00000	
.	02110	TEN4	0	40016	02144	00000 40016	
.	02111		11610	0	02145	11610 00000	
.	02112	TEN5	0	40021	02146	00000 40021	
.	02113		14152	0	02147	14152 00000	
.	02114	TEN6	0	40024	02150	00000 40024	
.	02115		17204	40000	02151	17204 40000	
.	02116	TEN7	0	40030	02152	00000 40030	
.	02117		11422	64000	02153	11422 64000	
.	02120	TEN10	0	40033	02154	00000 40033	
.	02121		13727	41000	02155	13727 41000	
.	02122	TEN11	0	40036	02156	00000 40036	
.	02123		16715	31200	02157	16715 31200	
.	02124	TEN12	0	40042	02160	00000 40042	
.	02125		11240	27620	02161	11240 27620	
.	02126	TEN24	0	40103	02162	00000 40103	
.	02127		12657	07274	02163	12657 07274	
.	02130	TEN36	0	40144	02164	00000 40144	
.	02131		14476	26234	02165	14476 26234	
.	02132	TEN50	0	40205	02166	00000 40205	
.	02133		16543	12370	02167	16543 12370	
.	02134	MTEN1	0	37775	02170	00000 37775	
.	02135		14631	46315	02171	14631 46315	
.	02136	MTEN2	0	37772	02172	00000 37772	
.	02137		12172	70244	02173	12172 70244	
.	02140	MTEN3	0	37767	02174	00000 37767	
.	02141		10142	23351	02175	10142 23351	

CAROS	LI	ID	LABEL	TA	STATEMENT		LOC	F	JKB	Y	NOTES
.	02142		MTEN4		0	37763	02176	00000	37763		
.	02143				15066	70565	02177	15066	70565		
.	02144		MTEN5		0	37760	02200	00000	37760		
.	02145				12370	55304	02201	12370	55304		
.	02146		MTEN6		0	37755	02202	00000	37755		
.	02147				10306	75720	02203	10306	75720		
.	02150		MTEN7		0	37751	02204	00000	37761		
.	02151				15327	74515	02205	15327	74515		
.	02152		MTEN10		0	37746	02206	00000	37746		
.	02153				12571	43561	02207	12571	43561		
.	02154		MTEN11		0	37743	02210	00000	37743		
.	02155				10456	02764	02211	10456	02764		
.	02156		MTEN12		0	37737	02212	00000	37737		
.	02157				15574	67755	02213	15574	67755		
.	02160		MTEN24		0	37676	02214	00000	37676		
.	02161				13634	50206	02215	13634	50206		
.	02162		MTEN36		0	37635	02216	00000	37635		
.	02163				12110	22777	02217	12110	22777		
.	02164		MTEN50		0	37574	02220	00000	37574		
.	02165				10554	11423	02221	10554	11423		
.	02166		HIBIT		40000	0	02222	40000	00000		
.	02167		SIXTY		60000	0	02223	60000	00000		
.	02170		SIXTYFIVE		65000	0	02224	65000	00000		
.	02171		M6L		77000	0	02225	77000	00000		
.	02172		SEVENTYONE		71000	0	02226	71000	00000		
.	02173		BIT5		01000	0	02227	01000	00000		
.	02174		FXCODE		0	0	02230	00000	00000		
.	02175		SIXTIES		60606	06060	02231	60606	06060		
.	02176		GAMMA		RESERVE	1	02232	00000	00000		
.	02177		BETA		RESERVE	1	02233	00000	00000		
.	02200		INTEGER		RESERVE	1	02234	00000	00000		
.	02201		FRACTION		0	0	02235	00000	00000		
.	02202		SIGN		RESERVE	1	02236	00000	00000		
.	02203		EXPONENT		RESERVE	1	02237	00000	00000		
.	02204		FPFRACTION		RESERVE	1	02240	00000	00000		
.	02205		IOINTEGER		RESERVE	2	02241	00000	00000		
.	02206		IOFRACTION		RESERVE	2	02243	00000	00000		
.	02207		IOEXPONENT		RESERVE	1	02245	00000	00000		
.	02210		EXPSIGN		RESERVE	1	02246	00000	00000		
.	02211		UNPACKBUFF		0	PBUF+1	02247	00000	02340		
.	02212		PACKBUFF		U-TAG	PREGION+1*PREGION+270	02250	02252	02304		
.	02213		PREGION		00	00	02251	00000	00000		
.	02214				RESERVE	260	02252	00000	00000		
.	02215				00	00	02304	00000	00000		
.	02216				RESERVE	260	02306	00000	00000		
.	02217		PBUF		RESERVE	1290	02337	00000	00000		
.	02220				NO-OP		02540	12000	00000		DUMMY
.	02221		FLTPT		PROGRAM	CORR8*16MAR64					
.	02222				IGNORE	FLTPT					
.	02223		PTR		MEANS	C4					
.	02224		POUT		MEANS	C4					
.	02225		FLTPT		ENTRY		02541	61000	00000		
.	02226				STR	B1*L(FP1)	02542	16110	02550		

CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	02227				STR B4•L(FP4)	02543	16410		02561	
.	02230				STR B5•L(FP5)	02544	16510		02652	
.	02231				STR B6•L(FP6)	02545	16610		02553	
.	02232				STR B7•L(FP7)	02546	16710		02554	
.	02233				RJP L(EFP+B7)	02547	66017		02656	
.	02234	FP1			ENT B1•0	02550	12100		00000	
.	02235	FP4			ENT B4•0	02551	12400		00000	
.	02236	FP5			ENT B5•0	02552	12500		00000	
.	02237	FP6			ENT B6•0	02553	12600		00000	
.	02240	FP7			ENT B7•0	02554	12700		00000	
.	02241				EXIT	02555	61010		02641	
.	02242	EFP		0	ADD	02556	00000		02600	ADDITION
.	02243			0	SUB	02557	00000		02637	SUBTRACTION 1
.	02244			0	MPL	02560	00000		02647	MULTIPLICATION
.	02245			0	DIV	02561	00000		02661	DIVISION
.	02246			0	STARTREAD	02562	00000		03441	DATA INPUT
.	02247			0	PUNCH	02563	00000		03004	PUNCH OUTPUT
.	02250			0	TYPE	02564	00000		03002	TYPE OUTPUT
.	02251			0	SET	02565	00000		02745	SET OUTPUT LENGTH
.	02252			0	FXTOFL	02566	00000		02747	FIX TO FLOAT
.	02253			0	FLTOFX	02567	00000		02757	FLOAT TO FIX
.	02254			0	SQR	02570	00000		03030	SQUARE ROOT
.	02255			0	SIN	02571	00000		04054	SINE OF ARGUMENT
.	02256			0	COS	02572	00000		04163	COS OF ARGUMENT
.	02257			0	ATAN	02573	00000		03122	ARCTANGENT OF ARGUMENT
.	02260			0	EXP	02574	00000		03202	EXPONENTIAL OF ARGUMENT
.	02261			0	ASIN	02575	00000		03444	
.	02262			0	ACOS	02576	00000		03650	
.	02263			0	LOGE	02577	00000		03673	
.	02264	ADD			ENTRY	02600	61000		00000	
.	02265				ENT A•L(B4)	02601	11014		00000	
.	02266				SUB A•L(B5)•ANEG	02602	21715		00000	C1 MINUS C2
.	02267				JP POS	02603	61000		02616	
.	02270				ENT Q•L(B5)	02604	10015		00000	C2 IS THE
.	02271				STR Q•W(B6)	02605	14036		00000	RESULTANT CHARACTERISTIC
.	02272				SEL CP•X77777	02606	51040		77777	C2 MINUS C1
.	02273				COM A•35•YLESS	02607	04600		00035	C2-C1 GREATER THAN 28
.	02274				STR A•L(SFT1)•SKIP	02610	15110		02627	NO
.	02275				JP NTR1	02611	61000		02634	YES
.	02276				ENT A•W(1+B5)	02612	11035		00001	
.	02277				STR A•W(WS)	02613	15030		03006	STORE LARGER MANTISSA
.	02300				ENT A•W(1+B4)	02614	11034		00001	
.	02301				JP SFT	02615	61000		02626	
.	02302	POS			ENT Q•L(B4)	02616	10014		00000	C1 IS THE RESULTANT
.	02303				STR Q•W(B6)	02617	14036		00000	CHARACTERISTIC
.	02304				COM A•35•YLESS	02620	04600		00035	C1-C2 GREATER THAN 28
.	02305				STR A•L(SFT1)•SKIP	02621	15110		02627	NO
.	02306				JP NTR	02622	61000		02633	YES
.	02307				ENT A•W(1+B4)	02623	11034		00001	
.	02310				STR A•W(WS)	02624	15030		03006	STORE LARGER MANTISSA
.	02311				ENT A•W(1+B5)	02625	11035		00001	
.	02312	SFT			ENT Q•0	02626	10000		00000	
.	02313	SFT1			RSH AQ•0	02627	03000		00000	SET RADIX POINTS

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CARDS    L1 ID LABEL      TA STATEMENT                    LOC    F JKB Y      NOTES

   .     02314            AOD  A•W(WS)                   02630  20030 03006  ADD LARGER MANTISSA
   .     02315            RJP  SCL                       02631  65000 02701  TO SCALE
   .     02316            EXIT                           02632  61010 02600
   .     02317 MTR        ENT  A•W(1+B4)•SKIP            02633  11134 00001  M1 RESULTANT MANTISSA
   .     02320 MTR1       ENT  A•W(1+B5)                 02634  11035 00001  M2 RESULTANT MANTISSA
   .     02321            STR  A•W(1+B6)                 02635  15036 00001  STORE RESULTANT
   .     02322            EXIT                           02636  61010 02600
   .     02323 SUB        ENTRY                          02637  61000 00000
   .     02324            ENT  A•L(B5)                   02640  11015 00000
   .     02325            STR  A•L(WS2)                  02641  15010 03010  C2
   .     02326            ENT  A•W(1+B5)                 02642  11035 00001
   .     02327            STR  A•CPW(WS3)                02643  15070 03011  COMPLEMENT M2
   .     02330            ENT  B5•WS2                    02644  12500 03010  SET B5
   .     02331            RJP  ADD                       02645  65000 02600  JUMP TO ADD ROUTINE
   .     02332            EXIT                           02646  61010 02637
   .     02333 MPL        ENTRY                          02647  61000 00000
   .     02334            ENT  A•L(B4)                   02650  11014 00000
   .     02335            ADD  A•L(B5)                   02651  20015 00000  C1 + C2
   .     02336            SUB  A•40000                   02652  21000 40000  RESULTANT C
   .     02337            STR  A•W(B6)                   02653  15036 00000
   .     02340            ENT  Q•W(1+B4)                 02654  10034 00001
   .     02341            MUL  W(1+B5)                   02655  22035 00001  (M1)(M2)
   .     02342            LSH  AQ•2                      02656  07000 00002  SHIFT FOR SCALE
   .     02343            RJP  SCL                       02657  65000 02701  TO SCALE
   .     02344            EXIT                           02660  61010 02647
   .     02345 DIV        ENTRY                          02661  61000 00000
   .     02346            ENT  A•W(1+B5)•AZERO           02662  11435 00001
   .     02347            ENT  A•L(B4)•SKIP              02663  11114 00000
   .     02350            JP   ERR                       02664  61000 03330  ZERO DIVISOR
   .     02351            SUB  A•L(B5)                   02665  21015 00000  C1-C2
   .     02352            ADD  A•40000                   02666  20000 40000  RESULTANT C
   .     02353            STR  A•L(B6)                   02667  15016 00000
   .     02354            ENT  Q•0                       02670  10000 00000
   .     02355            ENT  A•W(1+B4)                 02671  11034 00001  M1
   .     02356            RSH  AQ•2                      02672  03000 00002  PREPARE FOR DIVISION
   .     02357            DIV  W(1+B5)                   02673  23035 00001  M1 DIVIDED BY M2
   .     02360            STR  Q•A•APOS                  02674  14640 00000  QUOTIENT TO A. IS IT POS
   .     02361            ENT  Q•X-0•SKIP                02675  10140 77777  NO SET NEG
   .     02362            CL   Q                         02676  10000 00000  YES SO SET TO PLUS ZERO
   .     02363            RJP  SCL                       02677  65000 02701  TO SCALE
   .     02364            EXIT                           02700  61010 02661
   .     02365 SCL        ENTRY                          02701  61000 00000
   .     02366            JP   NEG•ANEG                  02702  60700 02714
   .     02367            RPT  36                        02703  70000 00036
   .     02370            LSH  AQ•1•ANEG                 02704  07700 00001
   .     02371            JP   ZERO                      02705  61000 02736  RESULT ZERO
   .     02372            SEL  CL•1                      02706  52000 00001
   .     02373            ADD  A•2•APOS                  02707  20600 00002
   .     02374            JP   AQR                       02710  61000 02723
   .     02375            RPL  Y+1•W(B6)                 02711  36036 00000  ADD 1 TO C
   .     02376            ENT  A•W(SCL2)                 02712  11030 02742  40000 00000 TO A
   .     02377            JP   AQR                       02713  61000 02723
   .     02400 NEG        RPT  36                        02714  70000 00036
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CARDS    L1 10 LABEL      TA STATEMENT                          LOC    F JKB Y      NOTES

   .     C2401               LSH  AQ•1•APOS                    02715  07600 00001
   .     C2402               JP   ZERO                         02716  61000 02736  RESULT ZERO
   .     C2403               SUB  A•2•ANEG                     02717  21700 00002
   .     C2404               JP   AQR                          02720  61000 02723  NO CHANGE
   .     C2405               RPL  Y+1•W(B6)                    02721  36036 00000
   .     C2406               ENT  A•W(SCL2+1)                  02722  11030 02743  37777 77777 TO A
   .     C2407 AQR           RSH  AQ•2                         02723  03000 00002  SET RAOIX PT
   .     C2410               SEL  CP•W(SCL2+2)                 02724  51030 02744  SET FIRST TWO BITS  0
   .     C2411               STR  A•W(1+B6)                    02725  16036 00001  RESULTANT MANTISSA
   .     C2412               STR  B7•Q                         02726  16700 00000  SHIFTS
   .     C2413               ADD  Q•W(B6)                      02727  26036 00000  CR + SHIFTS
   .     C2414               SUB  Q•34•QNEG                    02730  27700 00034  CR + SHIFTS -28, SKIP IF Q NEG

   .     C2415               STR  Q•W(B6)•SKIP                 02731  14136 00000  STORE RESULTANT CHARACTERISTIC

   .     C2416               JP   ZERO                         02732  61000 02736  RESULT ZERO
   .     C2417               SUB  Q•77777•QPOS                 02733  27600 77777
   .     C2420               EXIT                              02734  61010 02701
   .     C2421               JP   ERR                          02735  61000 03330  OVERFLOW
   .     C2422 ZERO          STR  B0•W(B6)                     02736  16036 00000
   .     C2423               STR  B0•W(1+B6)                   02737  16036 00001  RESULT IS ZERO
   .     C2424               ENT  A•0                          02740  11000 00000
   .     C2425 SCL1          EXIT                              02741  61010 02701
   .     C2426 SCL2          40000      00000                  02742  40000 00000
   .     C2427               37777      77777                  02743  37777 77777
   .     C2430               60000      00000                  02744  60000 00000
   .     C2431 SET           ENTRY                             02745  61000 00000
   .     C2432               EXIT                              02746  61010 02745
   .     C2433 FXTOFL        ENTRY                             02747  61000 00000
   .     C2434               ENT  Q•X(B4)                      02750  10044 00000  SCALING POINT TO Q
   .     C2435               ENT  Y-Q•40034                    02751  31000 40034  40034-S
   .     C2436               STR  A•W(B6)                      02752  15036 00000  CHARACTERISTIC
   .     C2437               ENT  Q•0                          02753  10000 00000
   .     C2440               ENT  A•W(B5)                      02754  11035 00000  FIX NO
   .     C2441               RJP  SCL                          02755  65000 02701  SCALE
   .     C2442               EXIT                              02756  61010 02747
   .     C2443 FLTOFX        ENTRY                             02757  61000 00000
   .     C2444               ENT  Q•X(B4)                      02760  10044 00000  SCALING PT WITH SIGN
   .     C2445               ADD  Q•L(B5)                      02761  26015 00000  CHARACTERISTIC
   .     C2446               SUB  Q•40000                      02762  27000 40000
   .     C2447               ENT  Y-Q•34•APOS                  02763  31600 00034
   .     C2450               JP   FLTOFX2                      02764  61000 02774  TO NEG BRANCH
   .     C2451               STR  A•L(FLTOFX1)                 02765  15010 02771  SETUP SHIFT
   .     C2452               SUB  A•36•ANEG                    02766  21700 00036  TEST FOR S GREATER THAN 29
   .     C2453               ENT  A•0•SKIP                     02767  11100 00000  CLEAR SHIFT GREATER THAN 30
   .     C2454               ENT  A•W(1+B5)                    02770  11035 00001  MANTISSA
   .     C2455 FLTOFX1       RSH  A•0                          02771  02000 00000  SHIFT
   .     C2456               STR  A•W(B6)                      02772  15036 00000  RESULTS
   .     C2457               EXIT                              02773  61010 02757
   .     C2460 FLTOFX2       COM  A•X77776•YLESS               02774  04640 77776
   .     C2461               JP   ERR12                        02775  61000 03350  LEFT SHIFT GREATER THAN 1
   .     C2462               ENT  A•W(1+B5)                    02776  11035 00001  MANTISSA
   .     C2463               LSH  A•1                          02777  06000 00001  SHIFT
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CARDS	LI IC	LABEL	TA	STATEMENT	LOC	F JKB Y	NOTES
.	C2464			STR A*W(B6)	03000	15036 00000	RESULT
.	C2465			EXIT	03001	61010 02757	
.	C2466	TYPE		ENTRY	03002	61000 00000	
.	C2467			EXIT	03003	61010 03002	
.	C2470	PUNCH		ENTRY	03004	61000 00000	
.	C2471			EXIT	03006	61010 03004	
.	C2472	WS		0 0	03006	00000 00000	
.	C2473	WS1		0 0	03007	00000 00000	
.	C2474	WS2		0 0	03010	00000 00000	
.	C2475	WS3		0 0	03011	00000 00000	
.	C2476	WS4		0 0	03012	00000 00000	
.	C2477	WS5		0 0	03013	00000 00000	
.	C2500	WS6		0 0	03014	00000 00000	
.	C2501	WS7		0 0	03015	00000 00000	
.	C2502	WS10		0 0	03016	00000 00000	
.	C2503	WS11		0 0	03017	00000 00000	
.	C2504	WS12		0 0	03020	00000 00000	
.	C2505	WS13		0 0	03021	00000 00000	
.	C2506	WS14		0 0	03022	00000 00000	
.	C2507	WS15		0 0	03023	00000 00000	
.	C2510	WS16		0 0	03024	00000 00000	
.	C2511	RZERO		STR B0*W(B6)	03025	16036 00000	
.	C2512			STR B0*W(B6+1)	03026	16036 00001	
.	C2513			JP FP4	03027	61000 02551	
.	C2514	SQR		ENTRY	03030	61000 00000	
.	C2515			ENT A*W(1+B4)*APOS	03031	11034 00001	IS MANTISSA POSITIVE
.	C2516			JP ERR13	03032	61000 03352	NO ERROR EXIT
.	C2517			ENT Q*W(SQR11)*ANOT	03033	10530 03101	MASK FOR 2 EXP(-21, 2 EXP(-31
.	C2520			STR A*L(B6)*SKIP	03034	15116 00000	RESULT CHARACTERISTIC ZERO
.	C2521			STR LP*A*SKIP	03035	47140 00000	EXTRACT RANGE FACTOR, SCALED 2 5
.	C2522			STR A*W(1+B6)*SKIP	03036	15136 00001	RESULT MANTISSA ZERO
.	C2523			RSH A*250*SKIP	03037	02100 00031	RANGE FACTOR SCALED 0
.	C2524			EXIT	03040	61010 03030	
.	C2525			ENT B5*A	03041	12570 00000	LOAD B5 WITH FACTOR
.	C2526			ENT Q*W(1+B4)	03042	10034 00001	M SCALED 28
.	C2527			MUL W(SQR2+B5)	03043	22035 03106	TIMES K SCALED 2
.	C2530			RSH AQ*2	03044	03000 00002	M(1) SCALED 28
.	C2531			STR Q*W(WS)	03045	14030 03006	SAVE M(1)
.	C2532			RSH Q*3	03046	01000 00003	TIMES 1/8
.	C2533			ADD Q*W(SQR1+1)	03047	26030 03102	MINUS B
.	C2534			MUL W(WS)	03050	22030 03006	
.	C2535			RSH AQ*290	03051	03000 00035	SCALED 27
.	C2536			ADD Q*W(SQR1+2)	03052	26030 03103	MINUS C
.	C2537			STR Q*W(WS+11)	03053	14030 03007	SAVE -A SCALED 27
.	C2540			CL Q	03054	10000 00000	SET UP
.	C2541			ENT A*W(WS)	03055	11030 03006	M(1)
.	C2542			RSH AQ*4	03056	03000 00004	SCALED 54
.	C2543			DIV W(WS+1)	03057	23030 03007	M(1)/(-A) SCALED 27
.	C2544			ADD Q*W(WS+11)	03060	26030 03007	MINUS A
.	C2545			STR Q*W(WS)	03061	14030 03006	SAVE -2(SQRT M(1)
.	C2546			ENT A*L(B4)	03062	11014 00000	CHARACTERISTIC

CAROS	L1	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	02547			ADD	A•W(SQR1+31	03063	20030	03104		PLUS BIAS
.	C2550			LSH	A•290	03064	06000	00035		HALVED
.	02551			STR	A•L(B61•ANEG	03065	15716	00000		TO RESULT CHECK EVEN/ODD
.	02552			MUL	W(SQR3+B5)•SKIP	03066	22135	03112		EVEN CHAR CORRECTION SCALED 29
.	02553			MUL	W(SQR4+B5)	03067	22035	03116		ODD CHAR
.	C2554			RSH	AQ•280	03070	03000	00034		N SCALED 28
.	02555			COM	Q•W(SQR1+4)•YLESS	03071	04230	03105		IS N NORMALIZED
.	02556			JP	SQRT1	03072	61000	03077		YES
.	02557			ENT	A•L(B61	03073	11016	00000		ADD 1
.	C256C			ADD	A•1	03074	20000	00001		TO
.	02561			STR	A•L(B61	03075	15016	00000		CHAR&
.	02562			RSH	Q•1	03076	01000	00001		NORMALIZE
.	02563		SQRT1	STR	Q•W(1+B61	03077	14036	00001		STORE RESULT
.	C2564			EXIT		03100	61010	03030		
.	02565		SQR1	0600000000		03101	06000	00000		MASK
.	02566			6376776144		03102	63767	76144		-B SCALED 28
.	02567			7500402153		03103	75004	02153		-C SCALED 27
.	C2570			0000040000		03104	00000	40000		BIAS
.	02571			2000000000		03105	20000	00000		1.0 SCALED 28
.	02572		SQR2	0000000007		03106	00000	00007		K(3) FOR BITS 00
.	02573			0000000006		03107	00000	00006		K(2) 01
.	C2574			0000000005		03110	00000	00005		K(1) 10
.	02575			0000000004		03111	00000	00004		K(0) 11
.	02576		SQR3	6371733412		03112	63717	33412		7 EXP(-1/2)+2•10 EXP(-9 SCALED 29
.	02577			6273720435		03113	62737	20435		6 EXP(-1/2)
.	02600			6154066433		03114	61540	66433		5 EXP(-1/2)
.	02601			5777777776		03115	57777	77776		4 EXP(-1/2)
.	02602		SQR4	5671230431		03116	56712	30431		(2/7) EXP(1/2)
.	C2603			5541454270		03117	55414	54270		(1/3) EXP(1/2)
.	02604			5360566233		03120	53605	66233		(2/5) EXP(1/2)
.	02605			5127660627		03121	51276	60627		(1/2) EXP(1/2)
.	02606		ATAN	ENTRY		03122	61000	00000		
.	C2607			ENT	Q•L(B41	03123	10014	00000		C
.	02610			COM	Q•40001•YMORE	03124	04300	40001		LESS THAN 40001
.	02611			JP	ERR16	03125	61000	03366		NO-ARGUMENT TOO LARGE
.	02612			COM	Q•37745•YLESS	03126	04200	37745		
.	C2613			JP	RZERO	03127	61000	03025		
.	02614		ATAN1	ENT	A•40000	03130	11000	40000		
.	02615			STR	A-Q•W(WS51	03131	33030	03013		TO A SET UP SHIFT
.	02616			ENT	Q•W(1+B41	03132	10034	00001		MANTISSA
.	C2617			RSH	Q•A	03133	01070	00000		CONVERT TO FIXED POINT
.	02620			STR	Q•W(WS51	03134	14030	03013		M
.	02621			MUL	W(WS51	03135	22030	03013		M2
.	02622			RSH	AQ•33	03136	03000	00033		
.	C2623			STR	Q•W(WS61	03137	14030	03014		M2
.	02624			ENT	B5•0	03140	12500	00000		
.	02625			ENT	Q•W(ATAN51	03141	10030	03174		
.	02626		ATAN2	MUL	W(WS61	03142	22030	03014		HASTINGS CONSTANT
.	C2627			RSH	AQ•35	03143	03000	00035		TO Q
.	02630			ADD	Q•W(ATAN5+B5+11	03144	26035	03175		
.	02631			BSK	B5•4	03146	71500	00004		
.	02632			JP	ATAN2	03146	61000	03142		

CARDS	LI ID	LABEL	TA	STATEMENT		LOC	F JKB Y	NOTES
.	C2633			MUL	W(WS5)	03147	22030 03013	M
.	C2634			RSH	AQ•34	03150	03000 00034	
.	C2635			JP	ATAN3•QNEG	03151	60300 03163	
.	C2636			RPT	36	03152	70000 00036	POS RESULT
.	C2637			LSH	Q•1•QNEG	03153	05300 00001	
.	C2640			JP	RZERO	03154	61000 03025	
.	C2641			ENT	A•37743+B7	03155	11007 37743	
.	C2642			STR	A•W(B6)	03156	15036 00000	OF RESULT
.	C2643			ENT	A•0	03157	11000 00000	CLEAR
.	C2644			LSH	AQ•34	03160	07000 00034	
.	C2645			STR	A•W(1+B6)	03161	15036 00001	MANTISSA OF RESULT
.	C2646			EXIT		03162	61010 03122	
.	C2647	ATAN3		RPT	36	03163	70000 00036	NEG RESULT
.	C2650			LSH	Q•1•QPOS	03164	05200 00001	
.	C2651			JP	RZERO	03165	61000 03025	
.	C2652			ENT	A•37743+B7	03166	11007 37743	
.	C2653			STR	A•W(B6)	03167	15036 00000	OF RESULT
.	C2654			ENT	A•3	03170	11000 00003	NEG SIGN
.	C2655			LSH	AQ•34	03171	07000 00034	
.	C2656			STR	A•W(1+B6)	03172	15036 00001	MANTISSA FOR RESULT
.	C2657			EXIT		03173	61010 03122	
.	C2660	ATAN5		77477	75334	03174	77477 75334	K 11
.	C2661			01536	53004	03175	01536 53004	K9
.	C2662			74214	27222	03176	74214 27222	K7
.	C2663			06143	01016	03177	06143 01016	K5
.	C2664			65266	23005	03200	65266 23005	K3
.	C2665			37777	50120	03201	37777 50120	K1
.	C2666	EXP		ENTRY		03202	61000 00000	
.	C2667			ENT	Q•W(1+B4)•QPOS	03203	10234 00001	MANTISSA
.	C2670			JP	EXP2	03204	61000 03217	
.	C2671			ENT	A•L(B4)	03205	11014 00000	CHARACTERISTIC
.	C2672			COM	A•40034•YMORE	03206	04700 40034	C LESS THAN 40034
.	C2673			JP	ERR17	03207	61000 03363	NO-OVERFLOW
.	C2674			COM	A•37744•YMORE	03210	04700 37744	C LESS THAN 37744
.	C2675			JP	EXP4	03211	61000 03224	NO
.	C2676	EXP1		ENT	A•40001	03212	11000 40001	
.	C2677			STR	A•W(B6)	03213	15036 00000	RESULT IS
.	C2700			ENT	A•W(EXP10)	03214	11030 03261	ONE
.	C2701			STR	A•W(1+B6)	03215	15036 00001	
.	C2702			EXIT		03216	61010 03202	
.	C2703	EXP2		ENT	A•L(B4)	03217	11014 00000	
.	C2704			COM	A•40034•YMORE	03220	04700 40034	
.	C2705			JP	RZERO	03221	61000 03025	
.	C2706	EXP3		COM	A•37744•YLESS	03222	04600 37744	C LESS THAN 37744
.	C2707			JP	EXP1	03223	61000 03212	YES
.	C2710	EXP4		MUL	W(EXP10+1)	03224	22030 03262	LOGE1/LN10
.	C2711			STR	A•W(WS12)	03225	15030 03020	
.	C2712			ENT	A•40032	03226	11000 40032	
.	C2713			SUB	A•W(B4)	03227	21034 00000	CHARACTERISTIC
.	C2714			STR	A•W(WS13)	03230	15030 03021	SET UP SHIFT
.	C2715			ENT	A•W(WS12)	03231	11030 03020	
.	C2716			RSH	AQ•W(WS13)•APOS	03232	03830 03021	CONVERT TO FIXED POINT
.	C2717			JP	EXP7	03233	61000 03256	NEG NUMBER

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CAROS    LI IC LABEL      TA STATEMENT                                  LOC    F JKB Y      NOTES

   .     C272C            ADD  A•40001                                  03234  20000 40001
   .     C2721            STR  A•W(B61                                  03235  15036 00000
   .     C2722 EXP5       ENT  A•0                                      03236  11000 00000
   .     C2723            RSH  AQ•1                                     03237  03000 00001
   .     C2724            MUL  W(EXP10+21                               03240  22030 03263
   .     C2725            RSH  AQ•35                                    03241  03000 00035
   .     C2726            STR  Q•W(WS141                                03242  14030 03022
   .     C2727            ENT  B5•0                                     03243  12500 00000  CLEAR
   .     C273C            ENT  Q•W(EXP10+31                             03244  10030 03264  K6
   .     C2731 EXP6       MUL  W(WS141                                  03245  22030 03022  K6X
   .     C2732            RSH  AQ•34                                    03246  03000 00034
   .     C2733            ADD  Q•W(EXP10+B5+41                          03247  26035 03265
   .     C2734            BSK  B5•5                                     03250  71500 00005
   .     C2735            JP   EXP6                                     03251  61000 03245
   .     C2736            ENT  A•0                                      03252  11000 00000
   .     C2737            LSH  AQ•35                                    03253  07000 00035
   .     C2740            STR  A•W(1+B6)                                03254  15036 00001  RESULT
   .     C2741            EXIT                                          03255  61010 03202
   .     C2742 EXP7       ADD  A•40000                                  03256  20000 40000
   .     C2743            STR  A•W(B6)                                  03257  15036 00000
   .     C2744            JP   EXP5                                     03260  61000 03236
   .     C2745 EXP10      10000      0                                  03261  10000 00000  MANTISSA OF 1
   .     C2746            27052      43542                              03262  27052 43542  LOGE1/LN10
   .     C2747            11504      04651                              03263  11504 04651  PROGRAM CONSTANT
   .     C275C            00056      24630                              03264  00056 24630  K
   .     C2751            00155      74340                              03265  00155 74340  K5
   .     C2752            01152      16565                              03266  01152 16565  K4
   .     02753            04035      41132                              03267  04035 41132  K3
   .     02754            12466      00553                              03270  12466 00553  K2
   .     C2755            22327      26210                              03271  22327 26210  K1
   .     C2756            20000      0                                  03272  20000 00000  FIXED POINT 1
   .     C2757 AERR1      STR  A•L(AERR2+21                             03273  15010 03315
   .     02760            CONSOLE    HOLD                               03274  64120 00142
                                                                        03275  03000 00000
   .     C2761            TYPET      $CR$$LF$$LF$FP ERROR$CR$AODR$S     03276  61000 03303
                          P$$SP$
                                                                        03277  04030 31325
                                                                        03300  05122 72724
                                                                        03301  27040 61111
                                                                        03302  27050 50000
                                                                        03303  64120 00142
                                                                        03304  00000 00022
                                                                        03305  00000 03277
   .     02762            ENT  Q•L(FLTPT1                               03306  10010 02541
   .     02763            SUB  Q•1                                      03307  27000 00001
   .     C2764            TYPEC      Q•$SP$•$SP$•$SP$•$SP$•$SP$         03310  64110 00141
                                                                        03311  00000 00000
                                                                        03312  77050 50505
   .     C2765 AERR2      TYPE 10D•AERR2                                03313  64120 00142
                                                                        03314  00000 00012
                                                                        03315  00000 03313
   .     02766            ENT  B4•L(FP41                                03316  12410 02551
   .     02767            ENT  B5•L(FP51                                03317  12510 02552
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CARDS	L1	IC	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C2770				ENT B6•L(FP6)	03320	12610	02553		
.	C2771				ENT B7•L(FP7)	03321	12710	02554		
.	C2772				CL A	03322	11000	00000		
.	C2773				CL Q	03323	10000	00000		
.	C2774				CONSOLE RELEASE	03324	64120	00142		
						03325	04000	00000		
.	C2775		FPSTOP		REX STOPRUN	03326	64120	00142		
						03327	05000	00000		
.	C2776		ERR		ENT B7•L(FP7)	03330	12710	02554		
.	02777				ENT A•L(AERR+B7)	03331	11017	03333		
.	C3000				JP AERR1	03332	61000	03273		
.	C3001		AERR		0 AOOFL	03333	00000	03337		
.	C3002				0 SBOFL	03334	00000	03341		
.	C3003				0 MLOFL	03335	00000	03343		
.	03004				0 OVOFL	03336	00000	03345		
.	C3005		AOOFL		0611110524	03337	06111	10524		
.	C3006				1321050505	03340	13210	50505		
.	C3007		SBOFL		3032070524	03341	30320	70524		
.	C3010				1321050505	03342	13210	50505		
.	C3011		MLOFL		2232210524	03343	22322	10524		
.	C3012				1321050505	03344	13210	50505		
.	C3013		OVOFL		1116330524	03345	11163	30524		
.	C3014				1321050505	03346	13210	50505		
.	03015		ERR11		ENT A•ERR20•SKIP	03347	11100	03365		
.	C3016		ERR12		ENT A•ERR21	03350	11000	03367		
.	C3017				JP AERR1	03351	61000	03273		
.	03020		ERR13		ENT A•ERR22•SKIP	03352	11100	03371		
.	C3021		ERR14		ENT A•ERR23	03353	11000	03373		
.	C3022				JP AERR1	03354	61000	03273		
.	C3023		ERR15		ENT A•ERR24•SKIP	03355	11100	03375		
.	C3024		ERR16		ENT A•ERR25	03356	11000	03377		
.	C3025				JP AERR1	03357	61000	03273		
.	C3026		ERR16A		ENT A•ERR40	03360	11000	03405		LOG ERROR
.	C3027				JP AERR1	03361	61000	03273		
.	C3030		ERR10		ENT A•ERR27•SKIP	03362	11100	03403		
.	C3031		ERR17		ENT A•ERR26	03363	11000	03401		
.	C3032				JP AERR1	03364	61000	03273		
.	C3033		ERR20		1621210530	03365	16212	10530		ILL SET NO
.	C3034				1231052324	03366	12310	52324		
.	C3035		ERR21		3010062112	03367	30100	62112		SCALE OFL
.	C3036				0524132105	03370	05241	32105		
.	03037		ERR22		3026270523	03371	30262	70523		
.	03040				1214052324	03372	12140	52324		
.	C3041		ERR23		3016230524	03373	30162	30524		
.	C3042				1321050505	03374	13210	50505		
.	C3043		ERR24		10243 00524	03375	10243	00524		
.	C3044				1321050505	03376	13210	50505		
.	C3045		ERR25		0631062305	03377	06310	62305		
.	C3046				2413210505	03400	24132	10505		
.	03047		ERR26		1235250524	03401	12352	50524		
.	C3050				1321050505	03402	13210	50505		
.	C3051		ERR27		2432312532	03403	24323	12532		
.	C3052				3105241321	03404	31052	41321		

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CARDS    LI IC LABEL      TA STATEMENT                                LOC    F JKB Y      NOTES
   .     C3053 ERR40         212414120S                               03405  21241 41205
   .     C3054               1227272427                               03406  12272 72427
   .     C3055 LERR          STR  A•L(LERR+3)                         03407  15010 03412
   .     C3056               RPL  Y+1•L(POW141                        03410  36010 03443
   .     C3057               STR  A•L(FLTPT1                          03411  15010 02S41
   .     C3060               ENT  A•0                                 03412  11000 00000
   .     C3061               JP   AERR1                               03413  61000 03273
   .     C3062 ERR2          ENT  A•ERR30•SKIP                        03414  11100 03425
   .     C3063 ERR3          ENT  A•ERR31                             03415  11000 03427
   .     C3064               JP   LERR                                03416  61000 03407
   .     C3065 ERR4          ENT  A•ERR32•SKIP                        03417  11100 03431
   .     C3066 ERR5          ENT  A•ERR33                             03420  11000 03433
   .     C3067               JP   LERR                                03421  61000 03407
   .     C3070 ERR6          ENT  A•ERR34•SKIP                        03422  11100 03435
   .     C3071 ERR7          ENT  A•ERR3S                             03423  11000 03437
   .     C3072               JP   LERR                                03424  61000 03407
   .     C3073 ERR30         2324310S24                               03426  23243 10S24
   .     C3074               1031050505                               03426  10310 50S05
   .     C3075 ERR31         23240S3106                               03427  23240 53106  NO TAB
   .     C3076               070505050S                               03430  070S0 50505
   .     C3077 ERR32         2324310S11                               03431  23243 10S11  NOT DEC
   .     C3100               1210050505                               03432  12100 50S05
   .     C3101 ERR33         2324051112                               03433  23240 51112  NO DEC PT
   .     C3102               100S2S310S                               03434  10052 53105
   .     C3103 ERR34         2706231412                               03435  27062 31412  RANGE ERR
   .     C3104               0512272705                               03436  06122 72705
   .     C3105 ERR35         1223110S10                               03437  12231 10S10  END CODE
   .     C3106               2411120505                               03440  24111 20505
   .     C3107 STARTREAD     ENTRY                                    03441  61000 00000
   .     C3110               EXIT                                     03442  61010 03441
   .     C3111 POW14         NO-OP                                    03443  12000 00000
   .     C3112 ASIN          ENTRY                                    03444  61000 00000
   .     C3113               ENT  A•40001                             03445  11000 40001  BIASED CHAR EQUALS 1
   .     C3114               SUB  A•L(B41•APOS                        03446  21814 00000  1-C, TEST C GREATER THAN 1
   .     C3115               JP   ERR16                               03447  61000 03356  YES ERROR
   .     C3116               ENT  B5•A                                03450  12570 00000  B5 EQUALS 1-C TEST C EQUALS 1

   .     C3117               JP   ASIN4•AZERO                         03451  60400 03613
   .     C3120               SUB  A•1•ANOT                            03452  21S00 00001  -C TEST C EQUALS 0
   .     C3121               JP   ASIN3                               03453  61000 03534  YES TO TEST ABS(M1 EQUALS 1/2

   .     C3122               COM  A•140•YMORE                         03454  04700 00016
   .     C3123               ENT  A•0•SKIP                            03455  11100 00000
   .     C3124 HERE          ENT  A•W(1+B41•SKIP                      03456  11134 00001
   .     C312S               JP   ASIN2                               03457  61000 03530
   .     C3126               LSH  A•1                                 03460  06000 00001  SCALED 29
   .     C3127               STR  A•W(WS1                             03461  15030 03006  SAVED
   .     C3130               RSH  AQ•290+B5                           03462  03005 00035  M•2••C EQUALS Y SCALED 29 EQUA
                                                                                         LS X
   .     C3131               STR  Q•W(WS+11                           03463  14030 03007
   .     C3132               MUL  W(WS+11                             03464  22030 03007
   .     C3133               RSH  AQ•290                              03465  03000 00035  SCALED 29 0 IN A
   .     C3134 ASIN1         STR  A•W(WS+11                           03466  15030 03007  STORE P
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CARDS	LI	IC	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	03135			MUL	W(ASINK)	03467	22030	03632		K•X••2
.	03136			RSH	AQ•290	03470	03000	00035		SCALED 29 EQUALS Z
.	03137			ENT	Y+Q•W(ASINK+3)	03471	30030	03635		Z+C
.	03140			STR	A•W(WS+2)	03472	15030	03010		SAVED
.	03141			ENT	A•W(ASINK+1)	03473	11030	03633		A
.	03142			STR	A+Q•Q	03474	32000	00000		+Z
.	03143			MUL	A	03475	22070	00000		(A+Z)••2
.	03144			RSH	AQ•290	03476	03000	00035		SCALED 29
.	03145			ADD	Q•W(ASINK+2)	03477	26030	03634		+B EQUALS U
.	03146			STR	Q•W(WS+3)	03500	14030	03011		SAVE U
.	03147			MUL	W(WS+2)	03501	22030	03010		U•(Z+C)
.	03150			RSH	AQ•290	03502	03000	00035		SCALED 29 EQUALS V
.	03151			ENT	Y+Q•W(ASINK+4)	03503	30030	03636		V+0
.	03152			SUB	Q•W(WS+3)	03504	27030	03011		V-0
.	03153			ADD	Q•W(ASINK+5)	03505	26030	03637		+E
.	03154			STR	A•W(WS+3)	03506	15030	03011		
.	03155			MUL	W(WS+3)	03507	22030	03011		
.	03156			RSH	AQ•290	03510	03000	00035		SCALED 29
.	03157			ADD	Q•W(ASINK+6)	03511	26030	03640		+F EQUALS ARCSIN X/2X
.	03160			MUL	W(WS)	03512	22030	03006		•M EQUALS (1/2)ARCSIN X SCALED 2B+C
.	03161			RSH	AQ•270+85	03513	03005	00033		•(4•2••C) EQUALS 2ARCSIN X SC 2B
.	03162			ENT	A•W(WS+1)•AZERO	03514	11430	03007		P SCALED 2B SKIP IF P EQUALS 0
.	03163			STR	A+Q•Q•SKIP	03515	32100	00000		P-2•ARCSIN X EQUALS ARCSIN Y
.	03164			RSH	Q•1	03516	01000	00001		ARCSIN Y SCALED 2B
.	03165			STR	Q•A•QPOS	03517	14240	00000		TEST M LESS THAN 0
.	03166			STR	A•A	03520	15040	00000		YES FORM ABS(M)
.	03167			RPT	290	03521	70000	00035		NORMALIZE
.	03170			LSH	A•1•ANEG	03522	06700	00001		SCALED 30
.	03171			JP	ASIN2+2	03523	61000	03532		M EQUALS 0
.	03172			LSH	A•290	03524	06000	00035		PRESERVE SIGN
.	03173			RSH	A•1•QPOS	03525	02200	00001		M SCALED 2B TEST M LESS THAN 0
.	03174			STR	A•A	03526	15040	00000		YES -ABS(M)
.	03175			ENT	Q•37745+87•SKIP	03527	10107	37745		C EQUALS (27-SF)-27+BIAS
.	03176		ASIN2	ENT	Q•A	03530	10070	00000		C EQUALS 0
.	03177			STR	Q•L(86)	03531	14016	00000		STORE ARCSIN Y
.	03200			STR	A•W(1+86)	03532	15036	00001		AS C,M
.	03201			EXIT		03533	61010	03444		
.	03202		ASIN3	ENT	Q•W(1+84)	03534	10034	00001		M EQUALS Y SCALED 28
.	03203			STR	Q•A•QNEG	03535	14340	00000		FORM
.	03204			STR	A•A	03536	15040	00000		-ABS(Y)
.	03205			ADD	A•W(ASINP+2)•ANOT	03537	20530	03643		1/2-ABS(Y) TEST ZERO
.	03206			JP	ASIN5	03540	61000	03622		YES USE (PI)/6
.	03207			ADD	A•W(ASINP+2)•QPOS	03541	20230	03643		(1-ABS(Y))1/2 SCALED 29
.	03210			STR	A•CPW(WS+1)•SKIP	03542	15170	03007		STORE X••2 AND
.	03211			STR	A•W(WS+11	03543	15030	03007		SAVE SIGN OF Y
.	03212			RPT	290•	03544	70000	00035		NORMALIZE
.	03213			LSH	A•1•ANEG	03545	06700	00001		SCALED 30
.	03214			JP	ASIN5-1	03546	61000	03621		ABS(X1 LESS THAN 2••-13 USE (P I1/2
.	03215			ENT	Q•A	03547	10070	00000		SAVE X••2

CARDS	LI	IC	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C3216			STR	B7•A	03550	16740	00000		26-SF
.	C3217			SUB	A•30D	03551	21000	00036		-(2+SF) EQUALS -(2-2C)
.	C3220			LSH	A•29D•ANEG	03552	06700	00035		-(1-C) TEST SF EVEN
.	C3221			LSH	Q•27D•SKIP	03553	05100	00033		NO (1/4)•X••2 SCALED 29EQUALS T/2
.	C3222			LSH	Q•28D	03554	05000	00034		YES (1/2)•X••2 SCALED 29 EQUALS T/2
.	C3223			STR	A•A	03555	15040	00000		1-C
.	C3224			ENT	B5•A	03556	12570	00000		TO B5
.	C3225			STR	Q•W(WS+2)	03557	14030	03010		SAVE T/2
.	C3226			MUL	W(ASINQ)	03560	22030	03645		A(T/2)
.	C3227			RSH	AQ•29D	03561	03000	00035		SCALED 29
.	C3230			ADD	Q•W(ASINQ+1)	03562	26030	03646		+(B/2)
.	C3231			MUL	W(WS+2)	03563	22030	03010		•(T/2)
.	C3232			RSH	AQ•29D	03564	03000	00035		SCALED 29 0 IN A-REG
.	C3233			ADD	Q•W(ASINQ+2)	03565	26030	03647		+(C/4)
.	C3234			STR	Q•W(WS)	03566	14030	03006		EQUALS (T••1/2)/4 APPROX EQUALS R1
.	C3235			ENT	Q•W(WS+2)	03567	10030	03010		T/2
.	C3236			LSH	AQ•26D	03570	07000	00032		•(1/8) EQUALS T/16 SCALED 58
.	C3237			DIV	W(WS)	03571	23030	03006		(T/16)/R1
.	C3240			ADD	Q•W(WS)	03572	26030	03006		+R1
.	C3241			RSH	Q•1	03573	01000	00001		•(1/2) EQUALS R2
.	C3242			STR	Q•W(WS)	03574	14030	03006		SAVE R2
.	C3243			ENT	A•W(WS+2)	03575	11030	03010		ONE MORE
.	C3244			CL	Q	03576	10000	00000		ITERATION
.	C3245			RSH	AQ•4	03577	03000	00004		YIELDS
.	C3246			DIV	W(WS)	03600	23030	03006		(T••1/2)/2
.	C3247			ADD	Q•W(WS)	03601	26030	03006		•2
.	C3250			LSH	AQ•31D	03602	07000	00037		EQUALS T••1/2 SCALED 29 EQUALS ABS(M)
.	C3251			ENT	Q•W(WS+1)•QNEG	03603	10330	03007		X••2 TEST SIGN
.	C3252			STR	A•CPW(WS)•SKIP	03604	15170	03006		STORE -M
.	C3253			STR	A•W(WS)	03605	15030	03006		STORE -M
.	C3254			ENT	A•W(ASINP+1)•QPDS	03606	11230	03642		(PI1/2 SCALED 28
.	C3255			STR	Q•Q•SKIP	03607	14100	00000		CHANGE SIGN
.	C3256			JP	ASIN1	03610	61000	03466		TO CALC FOR Y GREATER .5
.	C3257			STR	A•A	03611	15040	00000		-(PI1/2
.	C3260			JP	ASIN1	03612	61000	03466		TO CALC FOR Y LESS THAN -.5
.	C3261		ASIN4	ENT	Q•W(1+B4)	03613	10034	00001		M
.	C3262			STR	Q•A•QNEG	03614	14340	00000		FORM
.	C3263			STR	A•A	03615	15040	00000		-ABS(M)
.	C3264			ADD	A•W(ASINP+2)•AZERO	03616	20430	03643		+(1/2) TEST AZERO
.	C3265			JP	ERR16	03617	61000	03356		NO ERROR
.	C3266			ENT	B5•40001	03620	12500	40001		C FOR (PI1/2
.	C3267			JP	ASIN5+1	03621	61000	03623		
.	C3270		ASIN5	ENT	B5•40000	03622	12500	40000		C FOR (PI)/6
.	C3271			ENT	A•W(ASINP-40D00+B5)•QPOS	03623	11235	43640		(PI)/6OR(PI1/2 TEST M LESS
.	C3272			STR	A•A	03624	15040	00000		YES -(PI1/6 OR -(PI1/2
.	C3273			RSH	A•1	03625	02000	00001		M SCALED 28
.	C3274			STR	B5•Q	03626	16500	00000		C
.	C3275			STR	Q•L(B6)	03627	14016	00000		STORE ARCSIN Y

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CAROS    L) IC LABEL      TA STATEMENT                          LOC    F JKB Y      NOTES

.     03276               STR  A•W(1+B6)                        03630  15036 00001  AS C,M
.     03277               EXIT                                  03631  61010 03444
.     03300 ASINK         2041015167                            03632  20410 15167  K
.     03301               1070502075                            03633  10705 02075  A
.     03302               1507662270                            03634  15076 62270  B
.     03303               0125170245                            03635  01251 70245  C
.     03304               0151206634                            03636  01512 06634  D
.     03305               3121124150                            03637  31211 24150  E
.     03306               1720500666                            03640  17205 00666  F
.     03307 ASINP         2060251072                            03641  20602 51072  (PI)/6 SCALED 29
.     03310               3110375526                            03642  31103 75526  (PI)/2 SCALED 28
.     03311               1000000000                            03643  10000 00000  )/2 SCALED 28
.     03312               1444176653                            03644  14441 76653  (PI)/2 SCALED 27
.     03313 ASINQ         6570132340                            03645  65701 32340  -A SCALED 29
.     03314               2065211354                            03646  20652 11354  B/2 SCALED 29
.     03315               0204600545                            03647  02046 00545  C/4 SCALED 29
.     03316 ACOS          ENTRY                                 03650  61000 00000
.     03317               RJP  ASIN                             03651  65000 03444  GET ARCSIN Y
.     03320               ENT  A•40001                          03652  11000 40001  BIASED CHARACTERISTIC
.     03321               SUB  A•L(B6)                          03653  21016 00000  )-C
.     03322               ENT  Q•W(1+B6)                        03654  10036 00001  M SCALED 28
.     03323               RSH  Q•A                              03655  01070 00000  ARCSIN Y SCALED 27
.     03324               SUB  Q•W(ASINP+3)•QNEG                03656  27730 03644  -(PI)/2 SCALED 27
.     03325               JP   ACOS1                            03657  61000 03667  ARCOS Y EQUALS 0
.     03326               RPT  290                              03660  70000 00035  NORMALIZE (-ARCOS Y)
.     03327               LSH  Q•1•QPOS                         03661  05200 00001  WITH 26+C IN B7
.     03330               JP   ACOS1                            03662  61000 03667  (ARCOS Y EQUALS 0)
.     03331               LSH  Q•290                            03663  05000 00035  SAVE SIGN OF -M
.     03332               RSH  Q•1                              03664  01000 00001  AND SCALE 28
.     03333               STR  B7•A                             03665  16740 00000  26+C
.     03334               ADD  A•37746•SKIP                     03666  20100 37746  +BIAS-26 EQUALS C
.     03335 ACOS1         STR  Q•Q                              03667  14000 00000  SET FOR C EQUALS 0
.     03336               STR  A•L(B6)                          03670  15016 00000  STORE ARCOS Y
.     03337               STR  Q•CPW(1+B6)                      03671  14076 00001  AS C,M
.     03340               EXIT                                  03672  61010 03650
.     03341 LOGE          ENTRY                                 03673  61000 00000   LN(Y) IN FLOATING PT
.     03342               ENT  Q•W(1+B4)                        03674  10034 00001  MANTISSAEQMEQQ
.     03343               COM  Q•W(LOGER)•YMORE                 03675  04330 04004  TEST M LESS)
.     03344               JP   ERR16A                           03676  61000 03360
.     03345               ENT  Y-Q•W(LOGER+1)•ANEG              03677  31730 04005  TEST M GREATER )/2
.     03346               JP   LOGE1                            03700  61000 03727  NO,TRY M EQ )/2
.     03347               ENT  LP•W(LOGER+2)                    03701  40030 04006  GET I
.     03350               RSH  A•240                            03702  02000 00080  FOR K(I)
.     03351               ENT  B5•A                             03703  12570 00000  IN TABLE
.     03352               MUL  W(LOGEK+B5)                      03704  22035 04026  K(I)•Q
.     03353               RSH  AQ•290                           03705  03000 00035  SCALED 27
.     03354               SUB  Q•W(LOGER+1)                     03706  27030 04005  -) EQ X
.     03355               ENT  Y+Q•W(LOGEA+2)                   03707  30030 04012  X+C
.     03356               STR  A•W(WS)                          03710  15030 03006  SAVED
.     03357               ENT  Y+Q•W(LOGEA)                     03711  30030 04010  X+A
.     03360               STR  A•W(WS+1)                        03712  15030 03007
.     03361               MUL  W(WS+1)                          03713  22030 03007
.     03362               RSH  AQ•270                           03714  03000 00033  SCALED 27
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CAROS	L1	IO	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C3363			STR	Q•W(WS+11	03715	14030		03007	SAVEO
.	C3364			ADO	Q•W(LOGEA+11	03716	26030		04011	Z+B
.	03365			MUL	W(WS1	03717	22030		03006	•(X+C1
.	C3366			RSH	AQ•270	03720	03000		00033	SCALEO 27 EQ W
.	C3367			ENT	Y+Q•W(LOGEA+41	03721	30030		04014	W+E
.	03370			ADO	Q•W(LOGER+31	03722	26030		04007	W-3
.	03371			ADO	Q•W(LOGEA+31	03723	26030		04013	+(O+3)
.	C3372			ADO	Q•W(WS+1)	03724	26030		03007	+Z
.	C3373			STR	A•W(WS+11	03725	15030		03007	
.	C3374			MUL	W(WS+1)•SKIP	03726	22130		03007	
.	03375		LOGE1	ENT	Q•W(LOGEA+51•SKIP	03727	10130		04015	LN(2)
.	03376			DIV	W(LOGER+31•SKIP	03730	23130		04007	(-1/6) EQLN(X)-F•(-1/61
.	C3377			STR	Q•Q•SKIP	03731	14100		00000	-LN(2)
.	C3400			ADO	Q•W(LOGEF+B5)•SKIP	03732	26135		04016	+F•(-1/L1-LN(K(I))
.	03401			JP	ERR16A•ANOT	03733	60500		03360	
.	03402			STR	Q•W(WS)	03734	14030		03006	EQ LN(Q) SCALEO28
.	C3403			ENT	A•L(B41	03735	11014		00000	CHAR EQ P+2••14
.	C3404			SUB	A•40000•ANOT	03736	21500		40000	-BIASEQP,TEST P EQO
.	03405			JP	LOGE2	03737	61000		03764	YES SKIP CALC
.	03406			ENT	Q•A•QPOS	03740	10270		00000	TEST PLESSO
.	C3407			STR	Q•Q	03741	14000		00000	USE ABS(P)
.	03410			RPT	4•AOV	03742	70100		00004	RANGE OF P
.	03411			COM	Q•L(LOGES)•YMORE	03743	04310		04036	TO OBTR MIN SHIFTS
.	03412			JP	LOGEM	03744	61000		04042	
.	C3413			ENT	B5•U(LOGES+B7)	03745	12527		04036	FOR SCALING
.	03414		LOGE1A	MUL	W(LOGEA+51	03746	22030		04015	
.	03415			LSH	AQ•B5	03747	07005		00000	SCALEO 45 47 50 53 56
.	03416			JP	LOGEM+2	03750	61000		04044	
.	C3417			RPT	L(COUNT1	03751	70010		04053	NORMALIZE
.	C3420			LSH	AQ•1•ANEG	03752	07700		00001	PRODUCT
.	03421			JP	ERR16A	03753	61000		03360	
.	03422			LSH	AQ•580	03754	07000		00072	RETURN SIGN SCALEO 28
.	C3423			ENT	Q•L(B4)	03755	10014		00000	P
.	03424			COM	Q•40000•YLESS	03756	04200		40000	TEST P LESS 0
.	03425			STR	A•A	03757	15040		00000	YES -ABS(P)•LN(2)
.	03426			ENT	Q•W(WS)	03760	10030		03006	LN(Q)
.	C3427			ENT	B5•B7-260	03761	12507		77745	
.	03430			BJP	B5•LOGE2-1	03762	72500		03763	
.	03431			RSH	Q•B5•SKIP	03763	01105		00000	
.	03432		LOGE2	ENT	B7•270	03764	12700		00033	SET FOR NO SHIFTS(P EQ 0)
.	C3433			STR	A+Q•Q•QPOS	03765	32200		00000	LN(Y)
.	03434			STR	Q•Q	03766	14000		00000	ABS(LN(Y))
.	03435			JP	LOGE3•AZERO	03767	60400		04000	SKIP IF Y EQ 1
.	03436			STR	B7•W(WS)	03770	16730		03006	SAVE FACTOR
.	C3437			RPT	290	03771	70000		00035	NORMALIZE
.	03440			LSH	Q•1•QNEG	03772	05300		00001	ABS(LN(Y))
.	03441			JP	ERR16A	03773	61000		03360	
.	03442			LSH	Q•280•APOS	03774	05600		00034	RETURN SIGN SCALEO 28
.	C3443			STR	Q•Q	03775	14000		00000	AS MANTISSA
.	03444			ENT	A•W(WS)	03776	11030		03006	FORM
.	03445			ADO	A•37712+B7•SKIP	03777	20107		37712	CHARACTERISTIC
.	C3446		LOGE3	CL	Q	04000	10000		00000	
.	C3447			STR	A•L(B6)	04001	15016		00000	STORE

CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	03450				STR Q*W(1+B61	04002	14036	00001		RESULT
.	03451				EXIT	04003	61010	03673		
.	03452		LOGER		2000000000	04004	20000	00000		1SCALED 28
.	03453				1000000000	04005	10000	00000		1/2SCALED28
.	03454				0700000000	04006	07000	00000		MASK FOR I
.	03455				4777777777	04007	47777	77777		-3 SCALED 27 -6 SCALED26
.	03456		LOGEA		5770232732	04010	57702	32732		A SCALED 27
.	03457				3427564132	04011	34275	64132		B
.	03460				0724376530	04012	07243	76530		C
.	03461				4341324241	04013	43413	24241		D+3
.	03462				5712656427	04014	57126	56427		E
.	03463				1305620600	04015	13056	20600		LN(2) SCALED 28
.	03464		LOGEF		5366557053	04016	53665	57053		
.	03465				5557247242	04017	55572	47242		1
.	03466				5733156444	04020	57331	56444		2
.	03467				6074650576	04021	60746	50576		3
.	03470				6225723447	04022	62257	23447		4
.	03471				6347732466	04023	63477	32466		5
.	03472				6463606732	04024	64636	06732		6
.	03473				6572323037	04025	65723	23037		7
.	03474		LOGEK		3600000000	04026	36000	00000		I EQ 0 IN K(I) EQ15/(8+I) SCALED 28
.	03475				3252525253	04027	32525	25253		1
.	03476				3000000000	04030	30000	00000		2
.	03477				2564272135	04031	25642	72135		3
.	03500				2400000000	04032	24000	00000		4
.	03501				2235423542	04033	22354	23542		5
.	03502				2111111111	04034	21111	11111		6
.	03503				2000000000	04035	20000	00000		7
.	03504		LOGES		0002300014	04036	00023	00014		UPPER HALF
.	03505				0002600135	04037	00026	00135		SHIFT CONSTANTS
.	03506				0003101343	04040	00031	01343		LOWER HALF
.	03507				0003413426	04041	00034	13426		CHAR RANGE
.	03510		LOGEM		ENT B5+170	04042	12500	00021		
	03511				JP LOGE1A	04043	61000	03746		
.	03512				STR A*W(SAVE1	04044	15030	04052		
.	03513				ENT A*590	04045	11000	00073		
.	03514				SUB A*B5	04046	21005	00000		
.	03515				STR A*W(COUNT1	04047	15030	04053		
.	03516				ENT A*W(SAVE)	04050	11030	04052		
.	03517				JP LOGE1A+3	04051	61000	03751		
.	03520		SAVE		RESERVE 1	04052	00000	00000		
.	03521		COUNT		RESERVE 1	04053	00000	00000		
.	03522		SIN		ENTRY	04054	61000	00000		
.	03523				ENT A*L(B41	04055	11014	00000		
.	03524				COM A*37767*YMORE	04056	04700	37767		TEST EXPONENT LES 2EXP-10
.	03525				JP $+5	04057	61000	04064		NO
.	03526				STR A*L(B61	04060	15016	00000		SET SIN(X) EQ X
.	03527				ENT A*W(B4+11	04061	11034	00001		
.	03530				STR A*W(B6+1)	04062	15036	00001		
.	03531				EXIT	04063	61010	04054		
.	03532				COM A*40034*YMORE	04064	04700	40034		
.	03533				JP $*STOP	04065	61400	04065		EXPONENT GEQ 2EXP27

CAROS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C3534			CL	L(SINCOS2+1)	04066	16010	04101		
.	C3535			ENT	A•W(1+B4)	04067	11034	00001		
.	03536	SINCOS1		STR	A•W(SINCOS201•APOS	04070	15530	04161		ARG IN SINCOS20
.	C3537			CP	A•ANOT	04071	15540	00000		
.	C354C			JP	SINCOS7+1•AZERO	04072	60400	04147		
.	C3541			ENT	Q•40033	04073	10000	40033		
.	C3542			SUB	Q•L(B4)	04074	27014	00000		
.	03543			STR	Q•L(SINCOS2)	04075	14010	04100		
.	C3544			ENT	Q•A	04076	10070	00000		ARG TO Q
.	C3545			MUL	W(SINCOS101	04077	22030	04152		ARG TIMES 2/P1 IN AQ
.	03546	SINCOS2		RSH	AQ•0	04100	03000	00000		QTREV IN AQ AT B30
.	03547			AOO	A•0	04101	20000	00000		AOO 1 IF COSINE
.	C355C			SEL	CL•X77774	04102	52040	77774		
.	C3551			ENT	B7•A	04103	12770	00000		QUADRANT TO B7
.	C3552			RSH	AQ•1	04104	03000	00001		FRAC IN Q AT B29
.	03553			JP	$+1+B7	04105	61007	04106		
.	C3554			JP	$+3	04106	61000	04111		QUADRANT I
.	C3555			CP	Q•SKIP	04107	14100	00000		QUADRANT II
.	C3556			CP	Q	04110	14000	00000		QUADRANT III
.	03557			ENT	A•W(SINCOS201•APOS	04111	11530	04161		QUADRANT IV, ARG TO A
.	0356C			CP	Q	04112	14000	00000		-FRAC IF ARG NEGATIVE
.	C3561			STR	Q•W(SINCOS20)	04113	14030	04161		STORE X EQ + OR - FRAC AT B29
.	03562			MUL	W(SINCOS20)	04114	22030	04161		Y EQ X••2 IN AQ AT B58
.	03563			RSH	AQ•290	04115	03000	00035		Y IN Q AT B29
.	C3564			STR	Q•W(SINCOS20+1)	04116	14030	04162		
.	03565			ENT	B7•3	04117	12700	00003		
.	03566			ENT	Q•W(SINCOS11+41	04120	10030	04160		KSUB9 IN Q AT B32
.	03567			MUL	W(SINCOS20+1)	04121	22030	04162		Y TIMES POLY
.	C357C			ENT	Q•A	04122	10070	00000		TO Q
.	03571			AOO	Q•W(SINCOS11+B7)	04123	26037	04154		POLY EQ POLY+KSUB1
.	03572			BJP	B7•$-3	04124	72700	04121		
.	03573			MUL	W(SINCOS20)	04125	22030	04161		X•POLY IN AQ AT B57
.	C3574			JP	SINCOS6•ANEG	04126	60700	04134		
.	03575			CL	L(SINCOS6+6)	04127	16010	04142		
.	03576			RPT	320	04130	70000	00040		
.	03577			LSH	AQ•1•ANEG	04131	07700	00001		
.	C360C			JP	SINCOS7	04132	61000	04146		SIN(X) EQ 0
.	03601			JP	$+5	04133	61000	04140		
.	C3602	SINCOS6		CL	CPL($+6)	04134	16050	04142		
.	C3603			RPT	320	04135	70000	00040		
.	C3604			LSH	AQ•1•APOS	04136	07600	00001		
.	03605			JP	SINCOS7	04137	61000	04146		SIN(X) EQ 0
.	03606			ENT	Q•37743+B7	04140	10007	37743		
.	03607			STR	Q•W(B61)	04141	14036	00000		
.	C3610			ENT	Q•0	04142	10000	00000		PUT PROPER SIGN IN Q
.	03611			LSH	AQ•580	04143	07000	00072		SIN(X) IN A
.	03612			STR	A•W(1+B61	04144	15036	00001		
.	03613			EXIT		04145	61010	04054		
.	C3614	SINCOS7		CL	A	04146	11000	00000		SIN(X) EQ 0
.	03615			CL	W(B61)	04147	16036	00000		
.	03616			CL	W(1+B61	04150	16036	00001		
.	03617			EXIT		04151	61010	04054		

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CARDS    LI IC LABEL      TA STATEMENT                          LOC    F JKB Y      NOTES

   .     C3620 SINCOS10      2427630155                         04152  24276 30155  2/PI AT B29
   .     C3621               1000000000                         04153  10000 00000  1.0 AT B27
   .     C3622 SINCOS11      3110375522                         04154  31103 75522  K1 AT B28
   .     C3623               5325041750                         04155  53250 41750  K3 AT B29
   .     C3624               0506321276                         04156  05063 21276  K5 AT B30
   .     C3625               7731554634                         04157  77315 54634  K7 AT B31
   .     C3626               0002366574                         04160  00023 66574  K9 AT B32
   .     C3627 SINCOS20      0                                  04161  00000 00000  X HERE AT B29
   .     C3630               0                                  04162  00000 00000  Y EQ X**2 AT B29
   .     C3631 COS           ENTRY                              04163  61000 00000
   .     C3632               ENT   Q•L(COS)                     04164  10010 04163
   .     C3633               STR   Q•L(SIN)                     04166  14010 04054  SET EXIT ADDRESS
   .     C3634               ENT   A•L(B4)                      04166  11014 00000
   .     C3635               COM   A•37764•YLESS                04167  04500 37764  TEST EXPONENT GTR 2EXP-13
   .     C3636               JP    SINCOS8                      04170  61000 04202  NO, SET COS(X) EQ 1.0
   .     C3637               COM   A•40034•YMORE                04171  04700 40034  TEST EXPONENT TOO LARGE
   .     C3640               JP    $•STOP                       04172  61400 04172  YES
   .     C3641               ENT   A•1                          04173  11000 00001
   .     C3642               STR   A•L(SINCOS2+1)               04174  15010 04101
   .     C3643               ENT   A•W(1+B4)•APOS               04175  11634 00001
   .     C3644               CP    A•AZERO                      04176  15440 00000  $ARG$ IN A
   .     C3645               JP    SINCOS1•ANOT                 04177  60500 04070
   .     C3646               ENT   Q•A                          04200  10070 00000
   .     C3647               JP    SINCOS1                      04201  61000 04070
   .     C3650 SINCOS8       ENT   A•40001                      04202  11000 40001  COS(X) EQ 1.0
   .     C3651               STR   A•W(B6)                      04203  15036 00000
   .     C3652               ENT   A•W(SINCOS10+1)              04204  11030 04153
   .     C3653               STR   A•W(B6+1)                    04206  15036 00001
   .     C3654               EXIT                               04206  61010 04163

END OF LISTING
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LABEL	LOC	LABEL	LOC	LABEL	LOC
A$$$$$1111	03303	A$$$$$1112	03277	ACOS	03650
ACOS1	03667	ACQAZIM	63071	ACQELEV	63075
ACOU1	63427	ACTUALTIME	63142	ADDFL	03337
ADD	02600	ADSCN	63416	ADRR	03333
AERR1	03273	AERR2	03318	AESCN	63417
ALNGOFFSET	63517	AQR	02723	ARCOFAZIM	63524
ARCOFDEC	63526	ARCOFELEV	63522	ARCORRA	63530
ASIN	03444	ASIN1	03466	ASIN2	03530
ASIN3	03534	ASIN4	03618	ASIN5	03622
ASINK	03632	ASINP	03641	ASINQ	03645
ASTRODEC	63106	ASTRORA	63105	ATAN	03122
ATAN1	03130	ATAN2	03142	ATAN3	03163
ATAN5	03174	AUPEREQUAT	63341	AZELOTIME	63532
AZELBXSCAN	63500	AZIM	63058	AZIMOFFSET	63512
AZIMOUT	64000	AZIMOVER	63325	AZIMADD	63442
AZIMIN	75000	AZMTHSCAN	63501	BODYSIZE	63462
BOTLINE	00672	BOTMARG	00670	BETA	02233
BINOCTFLD	01360	BINOCTFLD1	01364	BINOCTFLD2	01365
BINOCTFLD3	01374	BINDECFRA	01376	BINDECFRA1	01406
BINDECFRA2	01407	BINDECINT	01327	BINDECINT1	01341
BINDECINT2	01342	BINDECINT3	01357	BINDECINT4	01355
BIT5	02227	BLASTOFF	63146	COCON	63414
COFF1	01435	COFFIX	01421	COFFTEM1	01453
COFFTEM2	01454	COFRND	01516	COFRND1	01527
COFRND10	01613	COFRND11	01616	COFRND2	01531
COFRND3	01533	COFRND4	01537	COFRND41	01542
COFRND5	01545	COFRND51	01556	COFRND52	01562
COFRND6	01565	COFRND7	01570	COFRND8	01575
COFRND81	01604	COFRND9	01607	COFXSTOR	01455
CONVERTIME	63135	CORCT	63420	COS	04163
COSORIENT	63065	COSAZEL	63070	COT1	01742
COT11	01753	COT2	01768	COT3	01766
COT4	01776	COT5	02001	COT6	02010
COT7	02021	COTFLT	01718	COTNEG1	02060
COTNEG11	02072	COTNEG2	02102	COTNEG3	02105
COTNEG4	02115	COTNEG5	02128	COTXT	02052
COUNT	04053	CAZIM	63060	CELBODY	63113
CELCOMPGM	63424	CELEV	63061	CELTIME	63133
CHARNO	01170	CHCOR	63422	CHPAR	63431
CRANGE	63057	CRSSOFFSET	63516	DOPPDOT	66000
DOPPADD	63444	DATANALYZE	63425	DAY	63150
DEC	63003	DECOFFSET	63515	DBCDOT	63010
DECLINSCAN	63505	DELTATEE	63316	DIV	02661
DSECONDS	63141	DUMSECTTG	63154	DVOFL	03345
DYDMP	63421	EFP	02566	ELEV	63054
ELEVOFFSET	63513	ELEVOUT	65000	ELEVADD	63443
ELEVIN	76000	ELVTNSCAN	63502	EQUATOR	63323
ERR	03330	ERR10	03362	ERR11	03347
ERR12	03350	ERR13	03352	ERR14	03353
ERR15	03355	ERR16	03356	ERR16A	03360
ERR17	03363	ERR2	03414	ERR20	03365

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LABEL	LOC	LABEL	LOC	LABEL	LOC
ERR21	03367	ERR22	03371	ERR23	03373
ERR24	03375	ERR25	03377	ERR26	03401
ERR27	03403	ERR3	03415	ERR30	03425
ERR31	03427	ERR32	03431	ERR33	03433
ERR34	03435	ERR35	03437	ERR4	03417
ERR40	03405	ERR5	03420	ERR6	03422
ERR7	03423	ESTSHIFTED	63143	EXP	03202
EXPONENT	02237	EXP1	03212	EXP10	03261
EXP2	03217	EXP3	03222	EXP4	03224
EXP5	03236	EXP6	03246	EXP7	03256
EXPNAME	63350	EXPSIGN	02246	FIRSTELEV	63104
FIRSTHRU	63153	FLATTENING	63337	FLTOFX	02757
FLTOFX1	02771	FLTOFX2	02774	FLTPT	02541
FP1	02550	FP4	02551	FP5	02552
FP6	02553	FP7	02554	FPFRACTION	02240
FPSTOP	03326	FRACTION	02235	FRAMESIZE	63101
FREQUENCY	63317	FXCODE	02230	FXTOFL	02747
GAMMA	02232	GEOCENLAT	63322	GEODETLAT	63321
GETADD	00727	GMTMODU24	63145	GMTSHIFTED	63144
HOLDNDHOLD	63511	HOURMINUTE	63137	HOURREG	63151
HEIGHT	63326	HERE	03456	HIBIT	02222
IOEXPONENT	02245	IOFRACTION	02243	IOINTEGER	02241
ID10RADID	66777	ID11RADIO	67776	ID12RADIO	67777
ID13RADIO	70775	ID14RADIO	70776	ID15RADIO	71776
ID16RADIO	71777	ID17RADIO	72776	ID1BRADIO	72777
ID19RADIO	73776	ID1CELCOR	63000	ID1ENTPNT	63410
ID1RADCOR	63050	ID1RADIO	63440	ID1RECRD	63210
ID1SYSENT	77576	ID1SYSNAM	77676	ID1SYSPAR	63310
ID1TIME	63130	ID20RADIO	75777	ID21RADIO	74776
ID22RADIO	74777	ID23RADIO	75776	ID24RADIO	75777
ID25RADIO	76775	ID26RADIO	76776	ID2CELCOR	06301
ID2ENTPNT	63411	ID2RADCOR	63051	ID2RADIO	63441
ID2RECRD	63211	ID2SYSENT	77577	ID2SYSNAM	77677
ID2SYSPAR	63311	ID2TIME	63131	ID3RADIO	63776
ID4RADIO	63777	ID5RADIO	64776	ID6RADIO	64777
ID7RADIO	65776	ID8RADIO	65777	ID9RADIO	66776
INAZIMADD	63446	INELEVADD	63447	INTEGER	02234
INTER	63413	INTERAZIM	72000	INTERCOM	63426
INTERDOPP	74000	INTERELEV	73000	INTERLCKSW	63460
INTERRANGE	76777	KMPERNM	63342	KYBRDLEVEL	63110
LOGE	03673	LOGE1	03727	LOGE1A	03746
LOGE2	03764	LOGE3	04000	LOGEA	04010
LOGEF	04016	LOGEK	04026	LOGEM	04042
LOGER	04004	LOGES	04036	LONGITUDE	63320
LAYUPIMT	00202	LAYUPSTOR	00766	LERR	03407
LINCNT	00673	LSPERAU	63336	M6L	02225
MAINSWITCH	63334	MCPFILLER	71000	MCPGM	63412
MILLSINADD	63451	MINREG	63152	MLOFL	03343
MPL	02647	MSFREQ	63332	MTEN1	02170
MTEN10	02206	MTEN11	02210	MTEN12	02212
MTEN2	02172	MTEN24	02214	MTEN3	02174

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LABEL	LOC	LABEL	LOC	LABEL	LOC
MTEN36	02216	MTEN4	02176	MTEN5	02200
MTEN50	02220	MTEN6	02202	MTEN7	02204
MTR	02633	MTR1	02634	NEG	02714
NIL	00000	NMPERAU	63340	POCT	00056
POCTA	00073	POCTB	00103	POCTERR	00107
POCTERR1	00113	POLE	63324	POS	02616
POW14	03443	PACKBUFF	02250	PAGESIZE	00102
PASTOR	01254	PBLANK	00237	PBLANK05	00253
PBLANK1	00262	PBLANK2	00272	PBLANK3	00300
PBLANK4	00303	PBLANK5	00304	PBLANK6	00305
PBUF	02337	PCOLIN	00335	PCOLIN1	00344
PCOLIN1A	00353	PCOLIN2	00356	PCOLIN3	00362
PCOLIN4	00363	PCOLIN5	00364	PCOLR	00306
PCOLR1	00315	PCOLR2	00323	PCOLR3	00326
PCOLR4	00332	PCOLR5	00333	PCOLRG	00334
PCOLUMN	00666	PENTA	00723	PENTRY	00706
PERIODAZIM	63523	PERIODDEC	63525	PERIODELEV	63521
PERIODRA	63527	PERROR1	01317	PERROR15	01323
PERROR4	01314	PERROR8	01325	PERROR9	01326
PERRORR	01256	PERRORR2	01266	PEXTINT	00665
PFORASTOR	00500	PFORBSTR	00476	PFORM	00411
PFORMERR	00474	PFD	00175	PFDA	00207
PFDB	00216	PFDC	00225	PFDERR	00232
PFDERR1	00236	PFIX	00114	PFIXB	00125
PFIXC	00140	PFIXO	00150	PFIXERR	00166
PFIXERR1	00173	PFIXERR2	00174	PFIXERRA	00167
PFIXF	00161	PFLOAT	01622	PFLTA	01631
PFLTB	01700	PFLTERR	01704	PFLTERR1	01711
PFLTERR4	01712	PFLTERRA	01705	PFRACA	01203
PFRACB	01223	PFRACERR	01220	PFRACERR1	01225
PFRACSTOR	01171	PIMAGE	00365	PIMAGE1	00404
PIMAGE2	00407	PIMAGE3	00410	PINT	00000
PINTB	00024	PINTC	00033	PINTERR	00050
PINTERR1	00054	PINTERR2	00055	PINTERRA	00051
PINTEXIT	00042	PLOTP	63436	PLANP	63434
PLAYBSTOR	00760	PLAYUP	00730	PLAYUPA	00744
PLAYUPR	00755	PQSTOR	01255	PREGION	02251
PRESTORE	01241	PREVIOUSTM	63461	PRINTWD	00674
PRLOG	63423	PRSCRIBC	00576	PSAVE	01226
PSCASTOR	00677	PSCQSTOR	00700	PSCRASTOR	00663
PSCRBUF	00562	PSCRIB	00501	PSCRIBA	00511
PSCRIBB	00516	PSCRIBC	00675	PSCRIBD	00676
PSCRIBERR	00610	PSCRIBF	00528	PSCRIBG	00572
PSCRIBH	00525	PSCRIBI	00548	PSCRIBJ	00540
PSCRIBSS	00620	PSCRIBSSA	00703	PSCRIBSSB	00704
PSCRIBSSC	00705	PSCRIBSW	00545	PSCRINT	00643
PSCRQSTOR	00664	PSCSAVE	00661	PSDSAVE	00662
PUNCH	03004	ROTATEAEBX	63507	ROTATERADN	63506
ROTATEROBX	63510	RA	63002	RAOFFSET	63514
RADOT	63007	RADARMODE	63312	RADCBXSCAN	63503
RADECOTIME	63531	RADIODEC	63541	RADIOMETER	63102

..... SPURT OUTPUT NO. 211 .....

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LABEL	LOC	LABEL	LOC	LABEL	LOC
RAOIORA	63540	RAOIUS	63006	RADIUSDOT	63011
RANGE	63052	RANGEOUT	70777	RANGEADD	63445
RANGEDOT	63062	RASCTNSCAN	63504	RDMTR	63430
ROXXX	63433	RECOROSIZE	63112	RECAZIM	67000
RECELEV	70000	RECFILE	63212	RECRD	63415
RECROSWTCH	63155	RELEASESW	63156	RZERO	03025
SAVE	04052	SAZIM	63055	SBOFL	03341
SCELTIME	63134	SCL	02701	SCL1	02741
SCL2	02742	SOEC	63005	SECONDS	63140
SELEV	63056	SET	02745	SEVENTYONE	02226
SFT	02626	SFT1	02627	SIDERTIME	63012
SIGN	02236	SIN	04054	SINORIENT	63064
SINAZEL	63066	SINCOS1	04070	SINCOS10	04152
SINCOS11	04154	SINCOS2	04100	SINCOS20	04161
SINCOS6	04134	SINCOS7	04146	SINCOS8	04202
SINTEMP	02133	SIXTIES	02231	SIXTY	02223
SIXTYFIVE	02224	SKIP	63331	SQR	03030
SQR1	03101	SQR2	03106	SQR3	03112
SQR4	03116	SQRT1	03077	SRA	63004
SRADTIME	63136	STARTREAO	03441	STATSTOR	00701
STATUS	00702	SUB	02637	SUPBSTOR	01513
SUPZRO	01457	SUPZRO1	01470	SUPZRO2	01471
SUPZRO3	01501	SUPZRO4	01506	SUPZRO5	01512
SYNCTIMING	63542	SYSCOMREG1	63452	SYSCOMREG2	63453
SYSCOMREG3	63454	SYSCOMREG4	63466	SYSCOMREG5	63456
SYSCOMREG6	63457	SYSENTRIES	77600	SYSNAMES	77700
SYSTAT1	63313	SYSTAT2	63314	SYSTATD	63315
TOPLINE	00671	TEN	02134	TEN1	02136
TEN10	02154	TEN11	02156	TEN12	02160
TEN2	02140	TEN24	02162	TEN3	02142
TEN36	02164	TEN4	02144	TEN5	02146
TEN50	02166	TEN6	02150	TEN7	02152
TIMECORR	63107	TIMEMODE	63103	TIMEP	63435
TIMETOHOLO	63520	TRUERANGE	63063	TRUETIME	63132
TTYSTATUS	63111	TWOSECOOP	63017	TWENTYSIXS	00667
TYPE	03002	UNPACKBUFF	02247	VELOFLIGHT	63335
VIZOEC1	63014	VIZOEC2	63016	VIZRA1	63013
VIZRA2	63015	WFORO	63432	WFADD	63450
WFFREQ	63333	WS	03006	WS1	03007
WS10	03016	WS11	03017	WS12	03020
WS13	03021	WS14	03022	WS15	03023
WS16	03024	WS2	03010	WS3	03011
WS4	03012	WS5	03013	WS6	03014
WS7	03015	YEARMONTH	63147	YRTRAN	63327
ZERO	02736	ZRTRAN	63330		

END OF LISTING

..... SPURT OUTPUT NO. 212 .....

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LABEL	LOC	LABEL	LOC	LABEL	LOC
PINT	00000	NIL	00000	PINTB	00024
PINTC	00033	PINTEXIT	00042	PINTERR	00050
PINTERRA	00051	PINTERR1	00054	PINTERR2	00055
POCT	00056	POCTA	00078	PAGESIZE	00102
POCTB	00103	POCTERR	00107	POCTERR1	00113
PFIX	00114	PFIXB	00126	PFIXC	00140
PFIXD	00150	PFIXF	00161	PFIXERR	00166
PFIXERRA	00167	PFIXERR1	00178	PFIXERR2	00174
PFD	00175	LAYUPLMT	00202	PFDA	00207
PFDB	00216	PFDC	00226	PFDERR	00232
PFDERR1	00236	PBLANK	00237	PBLANK05	00253
PBLANK1	00262	PBLANK2	00272	PBLANK3	00300
PBLANK4	00303	PBLANK5	00304	PBLANK6	00305
PCOLR	00306	PCOLR1	00316	PCOLR2	00323
PCOLR3	00326	PCOLR4	00332	PCOLR5	00333
PCOLRG	00334	PCOLIN	00336	PCOLIN1	00344
PCOLINIA	00353	PCOLIN2	00356	PCOLIN3	00362
PCOLIN4	00363	PCOLIN5	00364	PIMAGE	00365
PIMAGE1	00404	PIMAGE2	00407	PIMAGE3	00410
PFORM	00411	PFORMERR	00474	PFORBSTR	00476
PFORASTOR	00500	PSCRIB	00501	PSCRIBA	00511
PSCRIBB	00516	PSCRIBF	00528	PSCRIBH	00525
PSCRIPJ	00540	PSCRIB1	00548	PSCRIBSW	00545
PSCRBUF	00562	PSCRIBG	00572	PRSCRIBC	00575
PSCRIBERR	00610	PSCRIBSS	00620	PSCRINT	00643
PSCSAVE	00661	PSOSAVE	00662	PSCRASTOR	00663
PSCRQSTOR	00664	PEXTINT	00665	PCOLUMN	00666
TWENTYSIXS	00667	BOTMARG	00670	TOPLINE	00671
BOTLINE	00672	LINCNT	00678	PRINTWD	00674
PSCRIBC	00675	PSCRIBO	00676	PSCASTOR	00677
PSCQSTOR	00700	STATSTOR	00701	STATUS	00702
PSCRIBSSA	00703	PSCRIBSSB	00704	PSCRIBSSC	00705
PENTRY	00706	PENTA	00723	GETADD	00727
PLAYUP	00730	PLAYUPA	00744	PLAYUPB	00755
PLAYBSTOR	00760	LAYUPSTOR	00765	CHARNO	01170
PFRACSTOR	01171	PFRACA	01203	PFRACERR	01220
PFRACB	01223	PFRACERR1	01226	PSAVE	01226
PRESTORE	01241	PASTOR	01254	PQSTOR	01255
PERRORR	01256	PERRORR2	01266	PERROR4	01314
PERROR1	01317	PERROR15	01328	PERRORB	01325
PERROR9	01326	BINDECINT	01327	BINDECINT1	01341
BINDECINT2	01342	BINOECINT4	01356	BINOECINT3	01357
BINOCTFLO	01360	BINOCTFLO1	01364	BINOCTFLD2	01365
BINOCTFLO3	01374	BINOECFRA	01376	BINDECFRA1	01406
BINDECFRA2	01407	COFFIX	01421	COFFI	01435
COFFTEM1	01453	COFFTEM2	01454	COFXSTOR	01455
SUPZRO	01457	SUPZRO1	01470	SUPZRO2	01471
SUPZRO3	01501	SUPZRO4	01506	SUPZRO5	01512
SUPBSTOR	01513	COFRND	01516	COFRNO1	01527
COFRND2	01531	COFRND3	01533	COFRNO4	01537
COFRND41	01542	COFRND5	01545	COFRNO5I	01555

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LABEL	LOC	LABEL	LOC	LABEL	LOC
COFRND52	01562	COFRND6	01566	COFRND7	01570
COFRND8	01575	COFRND81	01604	COFRND9	01607
COFRND10	01613	COFRND11	01616	PFLOAT	01622
PFLTA	01631	PFLTB	01700	PFLTERR	01704
PFLTERRA	01705	PFLTERR1	01711	PFLTERR4	01712
COTFLT	01713	COT1	01742	COT11	01753
COT2	01763	COT3	01766	COT4	01776
COT5	02001	COT6	02010	COT7	02021
COTXT	02052	COTNEG1	02060	COTNEG11	02072
COTNEG2	02102	COTNEG3	02105	COTNEG4	02115
COTNEG5	02123	SINTEMP	02138	TEN	02134
TEN1	02136	TEN2	02140	TEN3	02142
TEN4	02144	TEN5	02146	TEN6	02150
TEN7	02152	TEN10	02154	TEN11	02156
TEN12	02160	TEN24	02162	TEN36	02164
TEN50	02166	MTEN1	02170	MTEN2	02172
MTEN3	02174	MTEN4	02176	MTEN5	02200
MTEN6	02202	MTEN7	02204	MTEN10	02206
MTEN11	02210	MTEN12	02212	MTEN24	02214
MTEN36	02216	MTEN50	02220	HIBIT	02222
SIXTY	02223	SIXTYFIVE	02224	M6L	02225
SEVENTYONE	02226	BITS	02227	FXCODE	02230
SIXTIES	02231	GAMMA	02232	BETA	02233
INTEGER	02234	FRACTION	02235	SIGN	02236
EXPONENT	02237	FPFRACTION	02240	IOINTEGER	02241
IOFRACTION	02243	IOEXPONENT	02245	EXPSIGN	02246
UNPACKBUFF	02247	PACKBUFF	02250	PREGION	02251
PBUF	02337	FLTPT	02541	FP1	02550
FP4	02551	FP5	02552	FP6	02553
FP7	02554	EFP	02556	A00	02600
POS	02616	SFT	02626	SFT1	02627
MTR	02633	MTR1	02634	SUB	02637
MPL	02647	DIV	02661	SCL	02701
NEG	02714	AQR	02723	ZERO	02736
SCL1	02741	SCL2	02742	SET	02745
FXTOFL	02747	FLTOFX	02757	FLTOFX1	02771
FLTOFX2	02774	TYPE	03002	PUNCH	03004
WS	03006	WS1	03007	WS2	03010
WS3	03011	WS4	03012	WS5	03013
WS6	03014	WS7	03015	WS10	03016
WS11	03017	WS12	03020	WS13	03021
WS14	03022	WS15	03023	WS16	03024
RZERO	03025	SQR	03030	SQRT1	03077
SQR1	03101	SQR2	03106	SQR3	03112
SQR4	03116	ATAN	03122	ATAN1	03130
ATAN2	03142	ATAN3	03168	ATAN5	03174
EXP	03202	EXP1	03212	EXP2	03217
EXP3	03222	EXP4	03224	EXP5	03236
EXP6	03245	EXP7	03256	EXP10	03261
AERR1	03273	A$$$$$1112	03277	A$$$$$1111	03303
AERR2	03313	FPSTOP	03326	ERR	03330

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LABEL	LOC	LABEL	LOC	LABEL	LOC
AERR	03333	ADDFL	03337	SBOFL	03341
MLOFL	03343	DVOFL	03345	ERR11	03347
ERR12	03350	ERR13	03352	ERR14	03353
ERR15	03355	ERR16	03356	ERR16A	03360
ERR10	03362	ERR17	03363	ERR20	03365
ERR21	03367	ERR22	03371	ERR23	03373
ERR24	03375	ERR25	03377	ERR26	03401
ERR27	03403	ERR40	03405	LERR	03407
ERR2	03414	ERR3	03415	ERR4	03417
ERR5	03420	ERR6	03422	ERR7	03423
ERR30	03425	ERR31	03427	ERR32	03431
ERR33	03433	ERR34	03435	ERR35	03437
STARTREAD	03441	POW14	03443	ASIN	03444
HERE	03456	ASIN1	03466	ASIN2	03530
ASIN3	03534	ASIN4	03613	ASIN5	03622
ASINK	03632	ASINP	03641	ASINQ	03645
ACOS	03650	ACOS1	03667	LOGE	03673
LOGE1	03727	LOGE1A	03746	LOGE2	03764
LOGE3	04000	LOGER	04004	LOGEA	04010
LOGEF	04016	LOGEK	04026	LOGES	04036
LOGEM	04042	SAVE	04052	COUNT	04053
SIN	04054	SINCOS1	04070	SINCOS2	04100
SINCOS6	04134	SINCOS7	04146	SINCOS10	04152
SINCOS11	04154	SINCOS20	04161	COS	04163
SINCOSB	04202	ID2CELCOR	06301	ID1CELCOR	63000
RA	63002	DEC	63003	SRA	63004
SDEC	63005	RADIUS	63006	RADOT	63007
DECDOT	63010	RADIUSDOT	63011	SIDERTIME	63012
VIZRA1	63013	VIZDEC1	63014	VIZRA2	63015
VIZDEC2	63016	TWOSECDOP	63017	ID1RADCOR	63050
ID2RADCOR	63051	RANGE	63052	AZIM	63053
ELEV	63054	SAZIM	63055	SELEV	63056
CRANGE	63057	CAZIM	63060	CELEV	63061
RANGEDOT	63062	TRUERANGE	63063	SINORIENT	63064
COSORIENT	63065	SINAZEL	63066	COSAZEL	63070
ACQAZIM	63071	ACQELEV	63075	FRAMESIZE	63101
RADIOMETER	63102	TIMEMODE	63103	FIRSTELEV	63104
ASTRORA	63105	ASTRODEC	63106	TIMECORR	63107
KYBRDLEVEL	63110	TTYSTATUS	63111	RECORDSIZE	63112
CELBODY	63113	ID1TIME	63130	ID2TIME	63131
TRUETIME	63132	CELTIME	63133	SCELTIME	63134
CONVERTIME	63135	SRADTIME	63136	HOURMINUTE	63137
SECONDS	63140	DSECONDS	63141	ACTUALTIME	63142
ESTSHIFTED	63143	GMTSHIFTED	63144	GMTMODU24	63145
BLASTOFF	63146	YEARMONTH	63147	DAY	63150
HOURREG	63151	MINREG	63152	FIRSTHRU	63153
DUMSECTTG	63154	RECRDSWTCH	63155	RELEASESW	63156
ID1RECRD	63210	ID2RECRD	63211	RECFILE	63212
ID1SYSPAR	63310	ID2SYSPAR	63311	RADARMODE	63312
SYSTAT1	63313	SYSTAT2	63314	SYSTATD	63315
DELTATEE	63316	FREQUENCY	63317	LONGITUDE	63320

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LABEL	LOC	LABEL	LOC	LABEL	LOC
GEOOETLAT	63321	GEOCENLAT	63322	EQUATDR	63323
POLE	63324	AZIMOVER	63325	HEIGHT	63326
YRTRAN	63327	ZRTRAN	63330	SKIP	63331
MSFREQ	63332	WFFREQ	63333	MAINSWITCH	63334
VELOFLIGHT	63335	LSPERAU	63336	FLATTENING	63337
NMPERAU	63340	AUPEREQUAT	63341	KMPERNM	63342
EXPNAME	63350	IDIENTPNT	63410	LD2ENTPNT	63411
MCPGM	63412	INTER	63413	COCON	63414
RECRO	63415	ADSCN	63416	AESCN	63417
CORCT	63420	DYOMP	63421	CHCOR	63422
PRLOG	63423	CELCOMPGM	63424	OATANALYZE	63425
INTERCOM	63426	ACQUI	63427	ROMTR	63430
CHPAR	63431	WFORO	63432	RDXXX	63433
PLANP	63434	TIMEP	63435	PLOTP	63436
ID1RADIO	63440	IO2RAOIO	63441	AZIMADD	63442
ELEVADD	63443	OOPPAOD	63444	RANGEADD	63445
INAZIMAOO	63446	INELEVAOO	63447	WFADD	63450
MILLSTNADO	63451	SYSCOMREG1	63452	SYSCOMREG2	63453
SYSCOMREG3	63454	SYSCOMREG4	63465	SYSCOMREG5	63456
SYSCOMREG6	63457	INTERLCKSW	63460	PREVLOUSTM	63461
BODYSIZE	63462	AZELBXSCAN	63500	AZMTHSCAN	635D1
ELVTNSCAN	63502	RADCBXSCAN	63503	RASCTNSCAN	63504
DECLINSCAN	63505	ROTATERADN	63506	ROTATEAEBX	63507
ROTATERDBX	63510	HOLONOHOLD	63511	AZIMOFFSET	63512
ELEVOFFSET	63513	RAOFFSET	63514	DECOFFSET	63515
CRSSOFFSET	63516	ALNGOFFSET	63517	TIMETDHDLO	63520
PERIODELEV	63521	ARCOFELEV	63522	PERIODAZIM	63523
ARCOFAZIM	63524	PERIODOEC	63525	ARCOFOEC	63526
PERIODRA	63527	ARCOFRA	63530	RAOECOTIME	63531
AZELOTIME	63532	RADIORA	63540	RADIODEC	63541
SYNCTIMING	63542	IO3RADIO	63776	ID4RADID	63777
AZIMOUT	64000	ID5RAOIO	64776	LD6RADID	64777
ELEVOUT	65000	ID7RADIO	65776	LO8RADID	65777
OOPPOUT	6600D	ID9RAOIO	66776	ID10RADID	66777
RECAZIM	67000	ID11RAOIO	67776	ID12RADID	67777
RECELEV	70000	ID13RAOIO	70776	ID14RADID	70776
RANGEOUT	70777	MCPFILLER	71000	IO15RADID	71776
ID16RADIO	71777	INTERAZIM	72000	ID17RADID	72776
IO18RADIO	72777	INTERELEV	73000	ID19RADIO	73776
ID20RAOIO	73777	INTERDOPP	74000	IO21RADID	74776
ID22RAOIO	74777	AZIMIN	75000	ID23RADID	75776
ID24RADIO	75777	ELEVIN	76000	ID25RADID	76775
ID26RAOIO	76776	INTERRANGE	76777	IO1SYSENT	77576
ID2SYSENT	77577	SYSENTRIES	77600	LO1SYSNAM	77676
ID2SYSNAM	77677	SYSNAMES	77700		

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13. ABSTRACT

The Printer Package is a set of general-purpose routines for: converting internally-stored numbers either in floating point, fixed point, integer, or octal form or alphanumeric strings to an output form suitable for printing; controlling format; and printing the output form. A user program by means of simple calling sequences can print virtually any information it has in a suitable form. The Printer Package and the user program are compiled together.

14. KEY WORDS

Haystack
printers

Printed by
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L. G. Hanscom Field
Bedford, Massachusetts